Learning Styles and Achievement in Postsecondary Classrooms

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Abstract

The purpose of this study was to investigate the relationship between learning styles and academic achievement in postsecondary education. It was the intent of the study to establish if there was a relationship between student learning style, teacher style, learner/teacher matching and/or mismatching, student gender and age, to the academic grades of students. This study was basically a replication of a study completed by Mary J. Thompson and Terrance P. O'Brien in 1991 on two campuses of a southeast community college in the United States. In the present study, 243 students and 18 teachers from two different campuses of a community college in the Province of Ontario participated in the research. All participants were administered the Gregorc Style Delineator and students identified by program, age and gender. Data were tested by two analysis of variance (ANOVA) models. In the first ANOVA model considered in this study, significant main effects were manifested in regard to the teaching style, age group and gender. With the exception of gender, these findings were very similiar to those of the original study. Duncan's multiple range test revealed that Concrete Sequential (CS) teachers assigned significantly lower grades than did teachers dominant in any of the other three learning styles. Post hoc testing revealed that students 25 years of age and older received significantly higher grades than did younger students. Female students also received significantly higher grades than did male students. In the second ANOVA model student/teacher learning style match/mismatch did emerge as a significant main effect. However, Duncan's multiple range test and Chi square analysis did not substantiate the relationship. Forty-eight references are cited.

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CHAPTER ONE: THE PROBLEM

Introduction

The purpose of this study was to investigate the relationship between learning styles and academic achievement in postsecondary education. The study focused on the Ontario community college system and was completed at Georgian College of Applied Arts and Technology. The study was a replication of previous research completed by Mary J. Thompson and Terrance P. O'Brien in 1991.

Background of the Problem

Historically, the Canadian educational system has struggled to meet the needs of society and its economic base, with student needs and the delivery of education at the elementary, secondary and postsecondary levels. The alliance between society and the educational system was necessary for both to remain viable institutions. This struggle is evident today at all educational levels, however this thesis will focus on the postsecondary system.

Postsecondary level students, and the economic base (which has moved from an industrial to a communication and service-based economy), have both changed significantly over the past decade. Education must now, more than ever, be presented in a model that addresses the needs of students and society. Educators can no longer operate in their ivory towers with little regard for the students and their role within the Canadian and global economy. Programs, curriculum models, alternate delivery modes and most importantly, educational strategies and principles, must be developed to meet the needs of the diverse student population and society.

The Province of Ontario at the community college level is evolving in order to meet the needs of a more diversified student population and a changing society. Statistics from the community college system in the Province of Ontario indicate that the average chronological age of students enrolled in colleges has increased steadily since 1980 (see Appendix A). When reviewing the statistics from the Ontario colleges, there was a significant decrease in the percentage of students under 20 years of age over the period of 1980 to 1992. In 1980, this age group represented almost 50% of the student body in comparison to only

approximately 30% in 1992, indicating a decrease of 20%. The most noticable increase in age category has been in the student age range of 20 to 25 years of age. Students in the age categories of 25 to 30 years of age and students 30 years of age and over have also shown a steady increase over the 12-year period. Should this trend continue, it would appear that students under 20 years of age may be the minority age group serviced by the college system in the future. Should this transpire, it would be essential to explore in detail the implications of such a shift for educators, employers and society.

There has also been a change in the gender distribution of students attending community colleges over the past decade. Both males and females under the age of 20 reached a peak in attendance during the academic years of 1982/83 and 1983/84 and both groups have consistently declined in attendance since that time period. Males 20 years of age and over also increased gradually in numbers from 1980 to 1989. There was however, a significant increase in the number of male students from 1989/90 to 1991/92. This could most likely be associated with the economic challenges faced by this group of people as a result of the recession which significantly affected the Province of Ontario. The most

significant and consistent increase was females over 20 years of age. In 1980 this group of students represented 23% of the student body and in 1992 they represented 36% of students serviced (the largest percentage of students). One could assume again that the recession has played a role in the change in numbers; however, this trend has been very consistent as evidenced in Appendix B. Many elements could be considered when explaining this trend. First, the role of women in society has changed and women are now marrying later in life. As a result, women require an income to support themselves both prior to marriage and in the event they should decide not to marry. Secondly, the majority of family units require two incomes to survive and females may feel they require a college education to assist with their responsibilities in the family unit. Thirdly, many women are left to support their families in the event of divorce and death of a spouse. All these factors could contribute to the increase in the number of female students 20 years of age and over attending postsecondary education at the college level. It would be interesting to look at statistics from the universities to determine if there is a similiar trend at the university level.

A further phenomenon is the increased number of part-time students

at the postsecondary level. Statistics (detailed in Appendix C) from Georgian College supported the growing percentage of part-time students accessing post-secondary studies. Cathy Neuss, Associate Registrar at Georgian College, confirmed this trend during a personal interview. Ms. Neuss stated that the actual numbers of part-time students registered does not reflect the demand for part-time studies. Most programs are over-subscribed and as a consequence, can only register a limited number of students. The college aspires to give priority to full-time students when filling over-subscribed programs for funding reasons. The college receives increased funding for students registered on a full-time basis.

Distance education packages, part-time studies or weekend courses to obtain the credentials required for the job market would be of benefit to this market (Ontario Council of Regents, 1990). Consequently, alternate delivery modes are being developed to meet the needs of part-time students who do not wish or are unable to because of other responsibilities, to physically attend an educational institution. It is anticipated that technology, the economy, and globalization will continue to force individuals to access educational upgrading to remain marketable within the global economy (lifelong learning).

The Provincial Government of Ontario legislated two major initiatives into the college system over the past two years that reflect our changing society and student population. The Prior Learning Assessment (PLA) directive acknowledged that students may have learning from life and work experiences that match courses provided by the college. This program enables students to challenge the courses and thus fast track through the system.

The changing demands of the workplace and the economy also precipitated the introduction of the College Standards and Accreditation Council (CSAC). This second initiative was mandated to ensure that provincial standards were developed for programs offered at the college level. General education courses, the development of generic skills and vocational learning outcomes were the main thrust of the initiative. Feedback from employers suggested that college graduates should have a more rounded education thus enabling them to function as team members when employed (Ontario Council of Regents, 1990). Adult learning principles and practices should be incorporated into the postsecondary system to accommodate the challenges faced by the initiatives and to foster lifelong learning practices.

Adult learning principles have existed in a philosophical sense within the educational realm for decades. For the most part however, they were not emphasized in the development and delivery of curriculum at the college level until recently. Historically, most college students were direct entry graduates from the secondary educational system (traditional students). These students were familiar with structured, semi-autocratic instruction and were often dependent on the teacher for their learning. Non-traditional students, defined as students who have been in the workforce and have returned to the educational system, expected teachers to function as facilitators. They wanted assistance when amalgamating their personal learning experiences with useful, current and related material.

The current students being serviced by the postsecondary system have high expectations of the institution, the teacher and themselves. Their return to the educational system is often accelerated by a job requirement or the need to secure a job. They support any learning theory or technique that enables them to successfully complete their schooling in a cost effective and timely manner.

Historically, college teachers were hired for their subject expertise

with little emphasis placed on teaching experience as a prerequisite for hiring. The college system now recruits applicants with both subject and teaching expertise. The long-term effect of the initial hiring practice has caused concern for the college system. Today it is critical that all teachers have some form of teacher training because of the diversified student population and the changing educational system. Human Resource Departments within colleges attempted to rectify this deficit by promoting and providing professional development opportunities that focused on teaching as a skill. Colleges supported Canadian and American university programs that provided distance education packages which enabled teachers in the college system to upgrade. Increased numbers of teachers accessed teacher training programs that helped them to cope with the changing student and their own role as a teacher. Learning style theories were introduced in many training packages and programs as an educational tool to assist teachers with their delivery, enhance student success and decrease attrition.

Much research has occurred at all levels in the educational system related to learning styles and their validity and application in the educational realm. The research results both validated and invalidated

their effectiveness as an educational tool that enhanced learning and academic achievement. Increased use of learning style inventories was recommended by supporters to assist educational institutions when meeting changing student needs.

Purpose of the Study

The study was completed to determine whether learning styles affected academic grading, and ultimately, student success, in postsecondary education. It was the intent of the study to establish if there were a relationship between student learning style, teacher style, learner/teacher matching and/or mismatching, student gender, and age, to the academic grades of students. The results were then related to the demands placed on the community college system, changing student demographics, adult learning principles, teacher training and classroom effectiveness and other applied research in the field. Recommendations for future study are detailed.

Research Questions

As discussed, this study was a replication of research completed by Thompson and O'Brien (1991) and explored similar questions as detailed in their research.

1. Is there a relationship between distribution of grades depending on the learning/teaching style of the teacher?

2. Are significantly different grades assigned to students with differing learning styles?

3. Do the grades of students under twenty-five years of age differ significantly from students who are over twenty-five?

4. Are significantly different grades assigned to students of different gender?

5. Do student gender, student age, and student learning style have any interactional effects on the assigning of grades by teachers of different learning/teaching styles?

6. Do teacher/student match and teacher/student mismatch of learning styles have any effect on grades distributed?

Rationale for Study

Society as a whole has forced the educational system to be more accountable for its programs and graduates. The global economy has hastened the demand for lifelong learning to which colleges must respond. Cultural diversity and learning histories of students have precipitated change in curriculum development and implementation. Statistics from the community college system demonstrated that the college student population has also changed both in chronological age and gender. Non-traditional students have placed different demands and expectations on the institution and its teachers. Government initiatives and funding to the college system in the Province of Ontario have forced administration and teachers to evaluate teaching and classroom effectiveness. As a result, educators are challenged to develop educational strategies to make education and learning relevant to both consumers of education and society. Learning styles have been identified as one possible means to this end.

Importance of the Study

The results of the research completed by Thompson and O'Brien (1991) contradicted previous research in the field, in the area of matching and mismatching of teacher/learner style with academic achievement. Rita Dunn (1983) in her article titled, "Teaching students through their individual learning styles: A research report," cited much research which supported the relationship between learner/teacher matching and academic achievement (Domino, 1970; Farr, 1971; Dunn, 1971; Dunn & Shockely, 1970, 1971; Dunn & Dunn, 1972, 1975, 1978; Cafferty, 1980; Cavanaugh, 1981; Fiske, 1981; Pizzo, 1981; Lemmon, 1982; and Shea, 1983). Recent research by Wells & Higgs (1990), Jones & Duffy (1991), and Bath & Blais (1993) encouraged the use of learning style theory for both students and teachers to promote student success. Replication of the study, in any case, added to the body of knowledge and theory on learning styles in education.

A further factor that supported replicating the study was the simplicity of the process and the instrumentation used (Gregorc Style Delineator). This was an asset in a practical sense, as it did not take a

great amount of time and effort to determine the learning styles of both the teacher and the student. Educators within the college system are more supportive of techniques that require limited classroom time as their main focus is on teaching. This technique required little time, was simple to interpret, did not require an extensive amount of training to administer and was cost effective. It also provided the student and the teacher with a comprehensive package on their learning style that they could use in their personal and professional life. Therefore, the duplication of the study was critical as it eventually could develop into a practical tool for both student and teacher.

Scope and Delimitations of the Study

The study was administered in a similar fashion as detailed by Thompson and O'Brien (1991) with minor variations in sampling. They conducted their research at an American community college and used two campuses for their sample population. This field experiment used a community college in the Province of Ontario with teachers and students from two campuses. Classification of the term community college is

different in the United States and the Province of Ontario. In the United States community colleges fulfill a university transfer function in postsecondary education. As a result there are different entrance requirements and expectations of students, as compared to a community college in the Province of Ontario. Community colleges in the Province of Ontario are a separate entity that do not function as transfer institutions. Some individuals colleges have articulation agreements with universities, however, they are negotiated within individual colleges on a program by program basis.

Outline of the Remainder of the Document

Chapter One provided a basic overview of the subject being studied. Topics included the introduction to the problem, background of the problem, purpose of the study, questions to be answered, rationale for the study, importance of the study and scope and delimitations of the study.

Chapter Two highlights literature on the use of learning styles and its implications for the field of education. Subjects include the historical framework of education, changing student demographics, adult learning

principles and theory, teacher training and classroom effectiveness, and learning style theory and applied research.

Chapter Three reviews the methodology and procedures of the research. Subject areas covered include research design, selection of teachers and students for the study, an overview of the Gregorc Learning Style Delineator, classroom procedures, data collection and processing, limitations of the research and a summary of the chapter.

Chapter Four details the results of the field experiment with a section provided for interpretation of the results. Tables accompanied by explanations are also included in Chapter Four.

Chapter Five provided a brief summary of the findings detailed in Chapter Four. Conclusions, implications for practice, theory and research and recommendations based on the results are critiqued and discussed.

CHAPTER TWO: LITERATURE REVIEW

Introduction

A brief historical framework of the Canadian educational system was provided as a backdrop for the inception of learning style theories as they exist today. The literature review proceeded to critique the changing student demographics of the Ontario community college system and their application to adult learning theory and principles. Teacher effectiveness and the use of learning style theory, in both training and the actual classroom environment, to accommodate the changing student population was discussed from a research perspective. The review concluded with examples of related research on matching learning and teaching styles.

Historical Framework of Education

The Canadian education system originated from the British structure of education and, as a result, was imperious and traditional in nature. Dewey (1963), in his first chapter of Experience and Education, described traditional education as very static, with information being

passed on through the generations regardless of the era and possible societal progression. Students were expected to ingest the information without questioning, and, in a sense, regurgitate it when directed by the teacher. There was little or no development of self, and individual behaviour was modified to meet the accepted standards of the time.

John Dewey was a pioneer of progressive education when Experience and Education was first published in 1938. His ideas were not accepted by the majority within the educational realm until the 1970s. Dewey proposed that educators should acknowledge and work with the student's life experience, as he believed that learning is achieved through personal experience. He further advocated that it was the responsibility of the teacher to work with these experiences and foster a positive learning environment. He emphasized that the curriculum should meet the needs and capabilities of the individual student. The social control within the classroom remained the responsibility of the teacher; however, he believed that, for the most part, social control was not necessary since students are active learners and are very interested in their educational experience. Thus began the emphasis of the personal psychology of the student in education.

Although Dewey was considered an anomaly in his time, it is interesting to note that many present principles of adult education reflect Dewey's theoretical base. It is certainly true that Dewey's principles complement much of the theoretical foundation of Learning Style Theory and its application in the classroom.

Changing Student Demographics

For the purpose of this thesis, Ontario community college student demographics include age and gender only, since the literature detailed throughout the paper does not differentiate on any other demographic variables. Further, the term "non-traditional student" reflects students who are nineteen years of age or over and qualify for postsecondary studies in education at a community college level. The majority of non-traditional students have been out of the educational system for an extended period of time. Much literature supports the trend that, chronologically, the average age of students upon commencement of postsecondary studies is increasing. This trend is evident within the Ontario community college system during the years 1980 to 1992 (see

Appendix A). The student population that was traditionally serviced by the community college system (students who often entered the college system immediately after high school) has decreased in size from 50% of the total population serviced in 1980 to 30% in 1992. The student population over 20 years of age has continued to increase significantly in the same time-frame. Also evident is an increase in the number of women enroled in postsecondary programs at Ontario community colleges (see Appendix B). Traditionally male and female students under 20 were the largest consumers of the college system. In 1992 the largest percentage of students were females over 20 years of age.

Many factors have contributed to these trends, notably recessive periods, economic restructuring and global competition (Ontario Council of Regents, 1990). Much of the training to be delivered through the community college system results from technological change. Continued increases in the non-traditional student population are expected, as community colleges are now in the formative stage of developing assessment processes to evaluate learning gained from past experiences for application to existing college level credits (Ontario Council of Regents Prior Learning Assessment Advisory Committee, 1992).

The College Standards and Accreditation Council discussion paper (Ontario Council of Regents, 1992) strongly emphasized the need for the Ontario community college system to address the diversified student population and their subsequent needs, by ensuring that students in college are introduced to an increased number of general education, generic skill and vocational learning outcomes. The intent is to ensure that college graduates have the ongoing skills necessary for lifelong learning and productive employment in our changing society.

Thus, the community college system is evolving. With this evolution, however, new systems of fostering learning and delivering curriculum must ensue.

Adult Learning Principles and Theory

Most research strongly differentiates between the learning principles applied to children and the learning principles applied to adults. Knudson (1980), however, stressed that the pedagogical and the andragogical approaches cannot be separated, and presented the Humanagogy approach, which appears to combine principles from both approaches.

Knudson proposed that no one person is either fully adultlike or fully childlike.

Mezirow (1981) emphasised the need for a Charter for Andragogy with the foremost emphasis on the role of the educator as an enhancer of self-directive learning. Adult learners are to define their learning needs and strategies, and educators are to emphasize experiential and participative instructional techniques. Gerald J. Pine and Peter J. Horne, as early as 1969, identified nine principles of learning which again reinforce Learning Style Theory. Their principles were based on interviews, documentation and observation of 120 community aides who worked with the rural poor in the New England States. The research acknowledged that change and learning must come from within and that they are based on experiences. Also acknowledged were individual problem-solving and learning styles and their significance on individual behaviour.

Donald J. Brundage and Dorothy Mackeracher (1980), in Adult Learning Principles and Their Application to Program Planning, detail comprehensive and significant research and subsequent analysis on the use of learning style inventories in education. For many in the field of

adult education, this publication is a well-respected resource. Their research supported the concept that biological elements (physiological and internal mental mechanisms) related to learning for both children and adults are comparable; however, elements related to the psychological, developmental, social and situational attributes generally differ between children and adults.

Brundage and Mackeracher acknowledged diverse learning styles and abilities as a major characteristic of the adult learner. Their research supported the concept that adult learners learn in different ways and that, when faced as a group, are not homogeneous in mental and learning abilities. Further, they found that teachers also have different learning styles and tend to teach to their own learning style. Brundage and Mackeracher found that, generally, when learning and teaching styles are mismatched, the outcome is usually unsatisfactory. Their extensive research also strongly supported the concept that while there are many ways to learn, this does not reflect mental ability or intelligence. Further, their research supported a belief that adult learners have the ability to quickly identify teachers who have learning style congruency. Brundage and MacKeracher (1980) cited research that was completed by

key learning style theorists (Hunt, 1971; Kidd, 1973; Hunt and Sullivan, 1974; Kolb and Fry, 1975; Cawley et al., 1976; Messick, 1976; Even, 1978; Taylor, 1979) to support their conclusions.

Teacher Training and Classroom Effectiveness

As detailed in the previous section, community college students are changing. Students have both maturity and life experience and no longer can it be assumed they will accept, and subsequently respond to, teaching which is delivered in a traditional, autocratic fashion. Brundage and Mackeracher (1980) outlined physiological characteristics, self-concept, stress and anxiety, past experiences, time, motivation and the paradoxes of adulthood as critical elements that affect student success.

Roger E. Haugen (1984) studied the relationship among length of teaching experience, pedagogical training of the instructor, and subject matter preparation with student ratings, and found a moderate statistical relationship exists. Faculty with formal training received higher ratings than did their colleagues with subject matter knowledge. Thus, it is assumed by Haugen that pedagogical and andragogical theory do enhance

student success.

Finklestein (1984) studied teaching effectiveness and classroom practices as they relate to trainable behaviours. His research found that the ability to stimulate the interest and actual knowledge of the students were the two critical elements. The ability to pique students' interest could be accomplished by introducing recent, relevant material into the classroom. He did not find a strong relationship between training and teacher effectiveness, as he alleged that many situational factors have varying effects on the classroom interaction.

Sara Edwards and Susan Barnes (1985) critiqued the Research In Teacher Education (RITE) program. The model was derived from research on teaching and change in the classroom, and it appears to be a very comprehensive, non-intrusive program. Research supports the approach that the RITE program is successful since ongoing training and practice alternatives are provided. Supporters stressed that it is both cost and time efficient. This type of model deserves merit as it enables practitioners to independently work on their skill development and to keep abreast of current issues and dimensions in education.

Nunes and Halloran (1987) conducted research and subsequently

developed a training program for Adult Basic Education Instructors (ABE). Competencies of the adult educator were ranked in order of significance as follows: (a) understanding the adult learner; (b) personal qualities; (c) knowledge of the field; (d) knowledge of teaching techniques; (e) creativity; (f) communication/ interpersonal skills; (g) professionalism; and (h) management/organization. Under the category of understanding the adult learner, it was recognized that research on adult development and the application of learning style strategies are critical for adult educators.

Andrea Parrot (1987) explored the use of theatre techniques as an instructional strategy in large classes. In her very amusing article, she detailed how different learning styles can be accommodated through theatrical lectures, and encouraged the use of this tool as a teaching strategy. Ms. Parrot taught a Human Sexuality class in which she performed different characters to reflect human sexuality issues in specific eras (Queen Victoria, Margaret Sanger, Renee Richards, Madonna and Virginia Johnson). Students who learn best by a visual and abstract learning style benefitted from her teaching strategy as they acknowledged that it made learning fun and easier.

Rannells Saul (1990) acknowledged that community colleges are faced with a definite challenge as a result of rapid technological change and changing societal norms. This scenario is complicated by the fact that many of the people requiring retraining will also require basic upgrading in literacy skills. Saul's research outlined the characteristics of adults, the content of program development and the learning situations as critical factors when delivering quality education. Saul included learning styles, teaching strategies and the similarities and differences between adults and their society as elements of the learning situation. Saul concluded that a successful training program for adult educators can be designed that would enable them to understand and apply critical theories and principles that relate to a changing education system. Such a program should consist of lifelong learning skills seminars, instructional strategies skill workshops, community practitioner involvement, the development of a trainer assessment program and an awareness of critical issues which exist in adult education. This research article strongly supports the direction provided to Ontario community colleges through the College Standards and Accreditation document produced by the Council of Regents.

Jack W. Keller and Frank L. Rabold (1990) detailed the results of a survey to 1,300 students that contradicts much of the literature on teacher training as cited above. Keller and Rabold list availability outside the class, exam or test review, practical application of material, and enthusiasm and love for the subject as the foremost behaviours required for a teacher to ensure student success. There was not a great emphasis on delivery mode, which ranked thirteen out of a possible fifteen, nor on the teachers' understanding of different learning styles. The research emphasized a need for different instructional delivery when classes are composed of males and females, and thus acknowledged the different learning styles related to gender differences. When these factors are taken into consideration with the changing trend in gender demographics in the community college system, implications for delivery are evident. As detailed in the previous section, there has been an increase in the number of female students serviced by the community college system. The research completed by Keller and Rabold (1990) indicated that females like a variety of teaching techniques and media, while male students look for a dynamic presentation with opportunity to ask questions outside of the classroom. It was also interesting to see that non-

traditional students want teachers to acknowledge their life experiences and apply them to the curriculum being explored. Traditional students wanted an opportunity to meet with teachers outside the classroom and very clear expectations of the requirements of the course.

The above literature review regarding teacher training programs shows that there is much available to assist teachers and administration in the development of training models in adult education. The vast majority of the literature emphasized the importance of learning style theory and application in an educational setting.

Learning Style Theories and Applied Research

Once again, the discussion of Learning Style theory begins with the work of John Dewey (1963). Dewey was involved in what could be defined as traditional experiential learning which is the basis for learning style theory and research. Although Dewey gave credit to the work of Francis Parker, he expanded the theory to promote student-centred education. It was, however, not until the mid-1970s that the term "learning style" came into its own. Since that time it has been a

prominent principle in both pedagogical and andragogical literature.

The National Association of Secondary School Principals (1982), in their published text titled Student Learning Styles and Brain Behaviour, cited an annotated bibliography of selected learning style instrumentation as detailed below. David A. Kolb was highlighted as the author and co-author of many texts during the 1970s detailing how the human mind works, with emphasis on its effect on organizational psychology. Kolb later designed the Learning Style Inventory which was a self-report inventory representing four possible learning modes: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. In 1972, R. Dunn and K. Dunn designed an actual paradigm to measure eighteen elements in four areas: environmental, emotional, sociological, and physical characteristics that affect learning. With Price (1979) and Cavanaugh, Eberle and Zenhausern (1983), they revised the instrument to include hemispheric and left and right cognitive style preferences. Dunn and Dunn continue to be key theorists in the field of Learning Style research.

Contributors to the realm of learning style theory that can be applied specifically to college students are Canfield and Canfield (1976). They

developed a Learning Styles Inventory (LSI) and Instructional Styles Inventory (ISI) which enable administrators to match learning and teaching styles. The instrument takes approximately fifteen minutes to administer. A further tool that has received significant attention was designed by Ronald R. Schmech, Fred Ribich, and Nerella Ramanaiah (1977), and is termed Inventory of Learning Processes. The inventory has sixty-two true/false items which reflect four styles of student information processing preferences. Witkin (1977) developed a tool which differentiated between field dependent and field independent learning. Witkin supported the ideology that different teaching techniques reflect these learning preferences and, when identified, enhance learning. Anthony F. Gregorc (1979) designed the Gregorc Style Delineator, which is a self-report tool that distinguishes four learning style preferences (Abstract Sequential, Abstract Random, Concrete Sequential and Concrete Random). D.E. Hunt (1979) developed the Conceptual Level matching model which he felt enabled students to understand their learning style and find a match for it given their conceptual makeup. Hunt stated that learners and educators should accentuate and work with their styles rather than against them. Hunt supported the matching of a students' concept

with a behavioural outcome followed by a teaching approach to enhance learning.

Although the annotated bibliography provided by the National Association of Secondary Principals detailed more tools and instruments (approximately 30 instruments) which exist that have been designed to measure cognitive, learning and personality style preferences, those mentioned above are the key theorists related to the field of adult education.

Much research has been completed to determine if learning style inventories have validity as instruments of research and subsequent theory development. Much of the literature details bipolar results, often depending on whether the individual completing the research is a strong advocate or an opponent of their use in the educational system. Rita Dunn (1983) amalgamated several research projects in her article titled, "Teaching students through their individual learning styles: A research report," which, for the most part, strongly supports the relationship between learning and teaching style matching and learner success. She cited research from Farr, 1971; Domino, 1970; Dunn, 1971; Dunn and Shockely, 1970, 1971; Dunn and Dunn, 1972, 1975, 1978; Cafferty, 1980;

Cavanaugh, 1981; Fiske, 1981; Pizzo, 1981; Lemmon, 1982; and Shea, 1983, that all, in one form or another, support the validity of learning style inventories in the classroom. All researchers document evidence to support the hypothesis that students who are taught in their preferred style show, statistically, notable accretion in their studies. Dunn did appropriately caution that many years are required to develop a valid and reliable tool; thus practioners must ensure that the instrumentation has been appropriately tested.

Cronbach and Snow's (1977) research did not support the assumption that matching teacher instructional strategies with learner style enhances student achievement. On the other hand, research completed by P.L. Peterson (1979) evidenced a relationship between student achievement and teacher/learning style. Peterson suggested that a match is not necessarily indicative of academic achievement but that it could improve student motivation and self-concept, thus enhancing learning. This area could benefit from further study as literature is available which supports the relationship between positive self- concept and academic achievement. Kampwirth and Bates (1980) also attempted to study the match and found that in the vast majority of studies (20 out of 22) there was no significant

relationship. There has, however, been reluctance to accept this ideology as it is perceived to threaten the very core of the educational system and affects how business is done.

The black and white approach to research on learning styles is further complicated by literature that acknowledges that even though there could be a valid match/mismatch of learning styles, over-dependency on learning style theory could result. Henson and Borthwork (1984), in their article, "Matching styles: A historical look," acknowledged the benefit, but cautioned all involved not to become too dependent on the theory. They felt that over-use could force both the teacher and the learner to become too dependent on style and, as a consequence, limit their creativity when faced with new learning situations. Doyle and Rutherford (1984) echoed this concern and questioned the validity of learning and teaching style matching. They questioned the simplicity of the principles underlying its use and were concerned about the potential for over-use within the educational realm. Further research was recommended to establish all dimensions and elements that affect academic achievement. Bruce Joyce (1984) proposed that learning transpires when an individual is challenged to think differently and to acknowledge opposing ideas and

concepts. He advocated that learning can only occur if there is disequilibrium in thought; this will not transpire in a learning environment that is too comfortable. Individual learners, he believed, have the ability to adapt their learning environment to their own learning needs which do not have to occur through teaching and learning style matching. Further concern over the simplicity of learning style-based education was expressed by Hyman and Rossoff (1984). They suggested that learning style-based education was too simplistic and gave too much power to the teacher. Teachers, they believed, were expected to determine the learning styles of the students and to subsequently match and adapt their teaching styles to meet the needs of the student. Hyman and Rosoff supported the merit of learning styles but perceived it as only one element of facilitative learning. In their article "A transition model," faculty and students were encouraged to share responsibility for both teaching and learning, thus acknowledging the complexities of the teaching/learning environment.

A major concern expressed within the field relates to the fact that the majority of the instruments are self-reporting, and adversaries suggest that students do not have an understanding of their learning preferences

and/or the ability to assess them. Extensive research at the Centre for the Study of Learning and Teaching Styles, St. John's University, supported the idea that the majority of students are able to assess their own learning styles and are quite accurate when doing so (Dunn, 1983).

The balance of the literature review examines recent studies that have been completed in the adult educational system which reflect learning style theory. Of note is that the majority of learning style research has taken place at the elementary and secondary school level. Research in the postsecondary system is now becoming more common and accepted within the field.

In 1987, Beverly Barber Martin completed her own research and produced a paper on learning-teaching styles schemes as a partial requirement for her Doctoral program. Martin used the teaching behaviours of Early Childhood educators and student interns as her sample population. The results of her study supported the direction that when student interns understand themselves and their learning and personality styles, they are more able to teach and interact with the children who are in their care. Student interns could also monitor their own teaching behaviours in the practicum setting, thus playing a key role

in modelling their teaching style. Further, when faculty were trained on learning styles and the effect on teaching, they were more able to work successfully with the student population. Martin did not advocate a match of the teacher and learner, but rather supported the philosophy that both understanding and accepting the fact that differences exist leads to effective learning.

Learning styles and learning preferences of first and fourth semester Baccalaureate Degree nursing students were studied by Deborah Wells and Zana Rae Higgs in 1990. The authors acknowledged past research which supported the direction that educators should be aware of the impact of learning styles in the classroom. However, they wanted to track the students to establish if learning style fluctuated over the program duration and to establish if nursing students have a predominant learning style as a professional group. Their research did indicate that the majority of students did operate from two similar learning styles. However, within these two styles, many different teaching techniques were preferred. There was no evidence to support that learning style preferences did change over the years of the program. They concluded that the knowledge of learning style preferences in the classroom would

certainly affect how the curriculum is to be delivered and subsequently affect student success.

Janet W. Jones and Donna K. Duffy (1991) identified the changing student demographics at a post-secondary level and the implications for training of persons teaching at this level. They, along with other staff members from Middlesex Community College, developed a forty-hour Activating Learning in the Classroom (ALC) program to enhance faculty skills in a supportive, collaborative environment. Their research led them to advocate strongly that faculty need to understand their teaching and learning styles in order to meet the needs of the changing student who wants to make the absolute most out of the student-teacher contact in the classroom. Teachers who have been involved in the volunteer program strongly support its merit and feel that it has the capacity to have a significant effect on student, teacher and institutional success. While this article is included herewith since it supports the body of the paper, a longitudinal study of the success of the ALC program would be a better indication of success.

Chere Campbell Gibson and Arlys O. Graff (1992) studied the relationship of students' preferred learning styles and perception of the

barriers to completion of External Baccalaureate Degree Programs through distance education. They used a representative sample which included both successful and unsuccessful students from their four distance programs and found that there was no significant difference in success based on their preferred learning styles. Their research findings did establish that the barriers were more psychological in nature, with the key ingredient being the level of confidence of the student. They proposed that completion could be possible for a good number of the unsuccessful students if initial identification and subsequent support were provided.

James Archer, Jr. (1993), in his recently published text titled Counselling College Students...A Practical Guide for Teachers, Parents, and Counsellors, openly acknowledged that the majority of colleges and universities do not take into consideration the different learning styles of the student population. Archer strongly supported the significance of learning styles and stated that they are a detrimental factor when determining student success.

John B. Bath and Kathleen Blais (1993) studied student nurses' learning styles in math to establish if there were any relationship with

their drug dosage calculation ability. The authors had intended to support their hypothesis, which predicted that there would not be a relationship between the two. However, their research findings did indicate a relationship. Bath and Blais advocate that this relationship should have a significant impact when teaching drug dosage calculations in the classroom. Faculty should reinforce the student's preferred learning style and develop additional practical strategies to encourage correct problem solving. The ability to correctly administer drug dosage is considered a critical skill in nursing education and the use of learning style theory is a valuable asset for educators of nurses.

Summary

Reflection on the literature reviewed, in the majority of cases, substantiated the appropriateness of learning style theory application in the community college system. The current literature on adult education, and the statistics provided by the Ministry of Education and Training, concur that our student population is changing, and will continue to change. From a historical perspective, education has moved from being

teacher and content centred to being student centred. Emphasis on the personal psychology of the student, acknowledgement and acceptance of various learning styles, abilities, and strategies, are common.

Adult learning principles and theory included learning styles theory as one integral element of student success. Teacher training advocates also support their legitimacy and encourage their inclusion into training sessions.

The majority of the literature emphasized the benefits of learning style theory to both the teacher and the learner. This is not stating that the application and use of learning style theory is infallible; however, there appears to be enough support to warrant further research regarding their use.

CHAPTER THREE: METHODOLOGY AND PROCEDURES

Introduction

The purpose of this study was to replicate research completed in 1991 by Mary J. Thompson and Terrance P. O'Brien. This chapter outlines the methodology utilized with the present study.

Research Design

Original research designed by Thompson and O'Brien (1991) investigated the effect of student learning styles, teacher styles, student gender, student age, and the teacher/learner match or mismatch of learning styles, on postsecondary grades (academic achievement). Thompson and O'Brien posited six research questions which this study also addressed.

The dependent variable of the research was the assignment of grades to the students by the teacher. The list of independent variables included student learning styles, teacher styles, student gender, student age and teacher/learner match and/or mismatch of learning styles.

Pilot Studies

The current field test used the research completed by Thompson and O'Brien (1991) as the pilot study. All teachers at a southeast college were administered the Gregorc Style Delineator (refer to Appendix D). Eight teachers from each of two different campuses were selected as the teacher sample (sixteen teachers in total). The teachers were selected because they exhibited a dominant style as defined by Gregorc's "pointy-head dominanco." A dominant learning style was indicated by a score between 27-40 points on the scale as detailed by Dr. Anthony Gregorc (1982). The student sample was a class taught by each of the sixteen teachers which totaled 207 students. They too were administered the Gregorc Style Delineator and their learning styles were recorded. The dependent variable of grades was selected after completing one term of studies to which the teacher assigned grades. Duncan's multiple range test was administered for post hoc testing. Two analyses of variance models using SAS Release 5.15 were used to address the research questions.

Research results indicated that there were significant main effects

with teaching style ($F = 5.30$, $p = .01$) as teachers who were classified as Concrete Sequential gave students significantly lower grades than their colleagues with other teaching styles (refer to Appendices F and G for Style Characteristics). Students who were 25 years of age and over received significantly higher grades than the younger student body ($F = 6.97$, $p = .01$). There were significant interactional effects between teaching style and student gender ($F = 4.65$, $p = .01$) as the research indicated that Abstract Sequential and Concrete Random teachers (refer to Appendix G for Style Characteristics) tended to give male students higher grades than females. Female students were assigned higher grades by teachers who had Concrete Sequential and Abstract Random teaching styles. Students 25 years of age and over were given higher grades by Concrete Sequential, Abstract Sequential and Abstract Random teachers. Concrete Random teachers' assigning of grades was the opposite ($F = 4.04$, $p = .01$). The results, however, contradicted much of the existing research on teacher/learner matching as the study did not show a significant relationship between grades received and the match between student and teacher ($F = 2.59$, $p = .05$). Much research supports the notion that when student and teacher learning styles are matched, students

most often show increased grades as detailed in the literature review in Chapter Two.

Selection of Sample

The sampling techniques used in the present research were very similar to those used by Thompson and O'Brien. Teachers at two campuses of Georgian College of Applied Arts and Technology were administered the Gregorc Style Delineator (refer to Appendix D). Consent was provided in writing by the teachers who agreed to participate in the research (refer to Appendix E for a copy of the letter sent to the teachers). Teachers who scored in the 27-40 point range (pointy-head dominanco) were chosen as the teacher sample (Gregorc, 1982). Gregorc suggested that a score in the 27-40 point range indicated a very strong preference to operate within such a channel. Eighteen teachers in total were chosen. The consent form also indicated that their names, and the names and grades of their students would be kept confidential (refer to Appendix E). They assigned the researcher a class of their choice and the class was administered the same delineator (243

students in total). The researcher administered the learning style delineator in each class (eighteen in total) and was available to answer any questions regarding semantics in the Gregorc Style Delineator. Student age, gender, program, student semester and campus were included in the data collection. Two hundred and forty-three students completed the delineator. The Gregorc Style Delineator took an average of nine minutes to complete. At the end of the semester the teacher provided the final grades of the students and the data analyses were completed. Copies of the style characteristics of participants' dominant learning style channel were provided for their personal and professional use (refer to Appendix F for a copy of the Style Characteristics of the Dominant Concrete Sequential individual).

Instrumentation

The Gregorc Style Delineator (refer to Appendix D) was used to measure the learning style of students and the teachers. It was introduced as a self-analysis tool in 1982 by Dr. Anthony Gregorc, after an eleven-year development period. Ten sets of four words must be ranked by the

individual completing the Delineator. The instructions stressed that the individual must be honest with him/herself and use his/her true self as the reference point when ranking the words. It is designed to measure the cognitive abilities of ordering and perception. Gregorc defined this mediation ability as the mental ability that enables people to receive and express information (Gregorc, 1979). He advocated that all individuals have such an ability, however, the process differs from person to person. Learning style can simply be defined as one's natural ability to understand one's self and the world, and the interaction between the two. Gregorc detailed four learning styles that included: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR), and Concrete Random (CR). Appendix G provides a Style Comparison of the four dominant channels as detailed in An Adult's Guide to Style (Gregorc, 1982). The abstract/concrete grid measured perception and the sequence/random grid measured ordering ability. Anthony Gregorc (1982) in, An Adult's Guide to Style, acknowledged that individuals usually have a natural predisposition to all four; however, they may have strong tendencies in one, two or three of the channels. Further, he conceded that individuals can adapt their natural tendencies to interact and

cope within their environment.

Thompson and O'Brien (1991), in their paper titled "Learning styles and achievement in postsecondary classrooms," cited research by Joniak and Isaksen (1988) and O'Brien (1990), which when combined, minimally substantiated the four scales as adequate measurements of learning styles thus supporting the validity and reliability of the Gregorc Style Delineator.

Teachers and students involved in the research at Georgian College of Applied Arts and Technology said that the Gregorc Style Delineator required a minimum amount of time to administer, and little explanation. They also enjoyed the comprehensive overview that detailed their learning style preference (refer to Appendix F) and the Style Comparison sheet that provided an overview of the four dominant channels (refer to Appendix G).

Data Collection and Recording

As detailed earlier, teachers at two campuses voluntarily completed the Gregorc Style Delineator. The teachers returned the completed form

and identified a class as the student sample. The teachers who exhibited the "pointy-head dominanco" were then contacted and an appointment was made to administer the delineator to the class. The "pointy-head dominanco" according to Gregorc (1982) indicated a strong preference to operate within a learning style channel. Ranking of the words was completed by the teacher and student sample. The researcher manually scored the delineators to determine learning styles. Personal information related to academic achievement of student participants was maintained by using code numbering. Campus location, gender and the names of the teacher sample were also coded.

The resulting data were entered on the Statistical Package for Social Sciences (SPSS) for analysis. Analyses included two analysis of variance (ANOVA) models and Duncan's multiple range test for post hoc testing. In the first ANOVA Model, the main effects of teaching style, student learning style, age, and gender, were analyzed in relationship to the course grade of students. Two-way interactions included teaching style and learning style, teaching style and age, and learning style and age, in relationship to grade. The first ANOVA Model spoke to the first five research questions. The second ANOVA Model explored the relationship

between the student learning style with the match/mismatch of the student/teacher on the course grade assigned. This was to address research question number six. A t-test for the Independent Samples of gender on course grade was completed. Crosstabulations of age by grade, program by grade and teaching style by grade were administered. Oneway Analysis of Variance was completed to indicate effects of age groups on course grade and teaching style on course grade.

Limitations

There were several possible limitations to the field test and subsequent results. The research was designed to measure the effect of student/teacher learning styles on academic grades. When one researched the topic, there were many other factors identified that could affect student grades from both a learner and teacher perspective.

Learner Perspective

Intelligence of the student could be a significant factor that was not

included as an independent variable. Academic achievement and intelligence have been shown to be indicative of student success. Motivation of the student was also not considered. An intelligent individual with an excellent teacher has resulted in poor student grades, when lack of student motivation was present.

Environmental factors were not considered in the research methodology when the administration of the delineator occurred. Lighting, noise level and temperature of the room may have affected the ranking of the Delineator. Dunn, Dunn, and Price (1975, 1978) actually included the variable of immediate environment (sound, light, temperature, and design) into the development of their tool, the Learning Style Inventory. A further critical element from a learner perspective is the timing of the administration of the Gregorc Style Delineator. Time was also classified as a physical element that affected learning in the Learning Style Inventory developed by Rita and Kenneth Dunn. Academic cycles produce an increased workload for students, with stress and anxiety as probable student outcomes. This may result in a skewing of the research if not considered in the methodology.

A student's perception of a teacher and the actual subject being taught

could also affect academic achievement. Students have placed levels of significance on different courses depending on the relationship of the course to their major area of study. This may result in a negative perception of a good teacher that subsequently could affect motivation and academic achievement.

The most significant limitation was the wording used in the Gregorc Style Delineator. Lack of understanding of the words used in the Delineator by the student had potential to skew the outcome of the Delineator. The researcher personally administered the delineator to the students and was available for questions; however, it cannot be assumed that students understood the words. Students may have been reluctant to ask questions because of peer pressure, lack of interest or lack of time. All of the above factors are limitations when completing the data analyses from a student's perspective. Learning styles are only one measure of academic achievement.

Teacher Perspective

Many elements that may have affected students and their completion

of the Gregorc Style are applicable to the teacher sample. Skewed results may have happened because of environmental conditions, timing of the administration, subject matter being taught and the semantics of the delineator. Teacher training and years of experience as a teacher may also affect academic grading. Class size, motivation, and enthusiasm play a role in teacher and academic grading.

A major limitation was that learning styles were measured against academic grades. Grading is not a universal science and most teachers grade in a different manner (normative versus criterion referenced assessment and formative versus summative evaluation). Because there was not an established consistent grading system for the teachers involved in the research, the assignment of academic grades was a significant limitation.

It was interesting that teachers involved in the research were concerned that names and grades would be exposed in the publication of the research. A number expressed this concern though it was in writing that all information would remain confidential and anonymous. One could question the legitimacy of the grades assigned because of the expressed concern regarding disclosure, possibly arising from both a

student (Freedom of Information) and teacher based reference point.

All of the above limitations may have affected the relationship between learning styles and academic grades and should be considered when interpreting the results.

CHAPTER FOUR: FINDINGS

In this section, the results of the data analyses are provided. The research findings and the interpretation of the tables are related to the research questions stated in Chapter One. A subsection comparing the present results to the original research results by Thompson and O'Brien (1991) is included.

Profile of the Sample

Table 1 details a comprehensive overview of the sample. Two-hundred and forty-three students and 18 faculty participated in the research. Females represented 62% of the sample and males 38%. Out of the 261 participants, 6 did not identify by gender.

Ninety-four percent of the sample population identified their age. The researcher did not require the age of the teachers; however, it appears that three out of the 18 included their age on the form. The student age breakdown included: 20% who were under 20, 30% who were 20 and 21, 25% who were between the ages of 22 and 26, and 25% who were over 27 years of age. Statistics detailed from the sample

Table 1

Profile of the Sample

Variable	Grade Value
Gender	
Female	62 (157)
Male	38 (98)
Age	
< 20	20 (49)
20-21	30 (73)
22-26	25 (60)
27 +	25 (61)
Campus	
Orillia	32 (83)
Barrie	68 (176)

(table continues)

(Table 1 continued)

Variable	Value
Program	
Civil Aviation	17 (44)
Office Admin.	23 (58)
Interim Semester	8 (19)
LASA	6 (14)
Nursing	12 (31)
Business	30 (76)
Dental Hygiene	5 (12)
Semester	
1	2 (4)
2	58 (135)
4	32 (74)
5	8 (19)

(table continues)

(Table 1 continued)

Variable	Value
Learning Style	
Concrete Sequential	42 (109)
Abstract Sequential	11 (29)
Abstract Random	26 (67)
Concrete Random	21 (55)
Grade	
< 66	22 (53)
66-74	27 (65)
75-83	25 (61)
84-100	26 (64)

support the trend that the chronological age of the student has increased within the college system. Appendix A confirmed that students under 20 years of age continuously declined in numbers from 1980 to 1992, where there was increased participation in all other age categories.

Thirty-two percent of the participants attended the Orillia campus of Georgian College of Applied Arts and Technology. This campus is female dominated as the programs offered at Orillia include Nursing, Early Childhood Education, Developmental Service Worker and the Dental Hygiene Program. Sixty-eight percent of the respondents attended the main campus of Georgian College in Barrie, Ontario. The Barrie campus has a more balanced ratio of males and females. The gender balance is notable as the majority of teachers at the Orillia campus are females. Two participants did not identify campus location.

Students were also asked to identify by program. Results showed that the majority of the sample population were from programs that tend to attract females. This would also correlate with the fact that 62% of the sample were females. Students from Office Administration (23%), Nursing (12%), and Dental Hygiene (5%) represented 40% of the sample. Male dominated programs included Civil Aviation (17%) and

Law and Security Administration (6%) totaling 13% of the participants. The Interim Semester (8%) and the Business Programs (30%) attract a combination of males and females.

Research on the subject of academic achievement and program positioning is limited. The initial semester in a program was often perceived as providing the most challenge to students as they were becoming familar with post-secondary academic requirements. Historically this was further complicated by the fact that traditional students were often away from home for the first time and were often faced with increased social, emotional and academic challenges. Academic workload often increases with program positioning and could provide increased academic challenge that could affect academic achievement. In the sample only 2% were in their first semester. This can be easily explained, as the grades used in the research were submitted in April, 1994 representing the second semester of the academic year. The majority of Georgian's programs have Fall-based registration only. Fifty-eight percent of the students were in their second semester. Thirty-two percent of the students sampled were in their fourth semester with 8% of the students in their fifth semester.

The key independent variable was the learning style channel of the teachers and the students. All participants completed the Gregorc Style Delineator; however, one was deemed invalid. Forty-two percent of the sample scored in the Concrete Sequential channel, 11% as Abstract Sequential, 26% as Abstract Random and 21% as Concrete Random. Forty-nine percent of the students received grades less than seventy-four percent and fifty-one percent received grades higher than seventy-four percent.

Contingency Analysis

Table 2 details a crosstabulation of age by grade. The results reveal that there is a significant relationship between age and grade (Chi-Square = 28.66, $p < .001$). Of the 61 students who were 27 years of age or older, 36% received grades of 84% or higher, while of the 49 students who were less than 20 years of age, 41% received grades of less than 66%. It was evident that age of student did play a role in academic achievement as there was a consistent decrease in the number of students receiving higher grades in the first age category (less than 20). This

Table 2

Crosstabulation of Age by Grade

	Grade			
Age	< 66	66-74	75-83	84-100
< 20	38 (20)	17 (11)	15 (9)	14 (9)
20-21	34 (18)	42 (27)	26 (16)	19 (12)
22-26	11 (6)	25 (16)	28 (17)	33 (21)
27 +	17 (9)	17 (11)	31 (19)	34 (22)

Chi-Square = 28.66, df = 9, p <.0001

relationship was exactly opposite for students and the grades received for participants between the age ranges of 22-26 and 27 years of age and older. The results detailed in Table 2 address question three that asked if grades of students under twenty-five years of age differ significantly from students who are over twenty-five.

There was also a significant relationship (Chi-Square = 63.47, p = .00001) between program and grade as detailed in Table 3. Students in the Office Administration, Interim Semester, Nursing and Dental Hygiene programs received significantly higher grades than students in the Civil Aviation and Law and Security Administration programs. The latter programs are dominated by male students and the former by female students. A relationship between grade and gender, and grade and program could be interpreted from the results. There was an equal distribution of grades in the business program that supported the statistics that there is a more equal balance of female and male students in the Business Program at Georgian. It would appear that significantly different grades are assigned to students of different gender (question number 4).

Table 3

Crosstabulation of Program by Grade

Program	Grade			
	< 66	66-74	75-83	84-100
Civil Aviation	38 (20)	20 (13)	8 (5)	8 (5)
Office Admin.	23 (13)	14 (9)	21 (13)	33 (21)
Interim Semester	0 (0)	9 (6)	7 (4)	14 (9)
LASA	4 (2)	14 (9)	5 (3)	0 (0)
Nursing	2 (1)	14 (9)	21 (13)	9 (6)
Business	32 (17)	29 (19)	30 (18)	27 (17)
Dental Hygiene	0 (0)	0 (0)	8 (5)	9 (6)

Chi-Square = 63.47, df = 18, p = .00001

Question number 1 explored the relationship between distribution of grades depending on the learning/teaching style of the teacher. In Table 4, it was notable that Concrete Sequential teachers assigned significantly lower grades than their colleagues operating in the other three styles (Chi-Square = 36.16, $p < .0001$)

In the first ANOVA model considered in this study, significant main effects were manifested regarding teaching style ($F = 10.155$, $p = .001$), age group ($F = 9.610$, $p = .001$), and gender ($F = 4.715$, $p = .031$). It should be noted that there was no significant relationship between teaching style and learning style, teaching style and age group, and learning style and age group.

Oneway Analysis of Variance is illustrated in Tables 6 and 7. Table 6 confirms that there is a significant relationship between age groups and course grades ($F = 16.867$, $p = .0001$). There also was a level of significance between teaching styles and course grades as detailed in Table 7 ($F = 8.6023$, $p = .0001$). The test results supported questions 3 and 1 respectively.

Table 4

Crosstabulation of Teaching Style by Grade

	Grade			
Teaching Style	< 66	66-74	75-83	84-100
Concrete Sequential	62 (33)	39 (25)	39 (24)	31 (20)
Abstract Sequential	2 (1)	11 (7)	18 (11)	30 (19)
Abstract Random	32 (17)	29 (19)	34 (21)	34 (22)
Concrete Random	4 (2)	22 (14)	8 (5)	5 (3)

Chi-Square = 36.16, df = 9, $p < .0001$

Table 5

Effects of Selected Teacher and Student Variables on Course Grade

	ANOVA Model 1				
Source	Sum of Squares	df	Mean Square	F	p
Main Effects	7459.113	9	828.790	6.246	.001
Teaching Style	4042.205	3	1347.402	10.150	.001
Student Learning Style	20.519	3	6.840	.052	.985
Age Group	3825.325	3	1275.108	9.610	.001
Gender	603.089	1	603.089	4.715	.031
2-Way Interactions	2808.107	27	104.004	.784	.770
Teaching Style x Learning Style	594.147	9	66.016	.498	.875
Teaching Style x Age Group	1628.313	9	180.942	1.364	.207
Learning Style x Age Group	708.257	9	78.695	.593	.802

Table 6

Effects of Age Groups on Course Grade

	Oneway Analysis of Variance				
Source	Sum of Squares	df	Mean Square	F	p
Between Groups	2480.9844	1	2480.9844	16.867	.0001
Within Groups	35449.2214	241	147.0922		
Total	37930.2058	242			

Table 7

Effects of Teaching Style on Course Grade

	Oneway Analysis of Variance				
Source	Sum of Squares	df	Mean Square	F	p
Between Groups	3696.4911	3	1232.1637	8.6023	.0000
Within Groups	34233.7147	239	143.2373		
Total	37930.2058	242			

Table 8 further explored the effects of gender on course grade. Students' t-test to measure independent samples of gender established a Mean Difference of 6.0595 between males and females ($t = 3.59$, $p < .001$) in Table 8.

Student/teacher learning style Match/Mismatch emerged as a significant main effect in Table 9. The effect initially supported question 6 that addressed grade distribution and its relationship to teacher/student matching and mismatching of learning styles. However, Duncan's multiple range test and Chi-square analyses did not substantiate the relationship.

Summary of Findings

To conclude, there were significant relationships implied in regard to teaching style, age group and gender. Teachers with a Concrete Sequential learning style gave students significantly lower grades than their colleagues who operated in the other three learning style channels. Students 25 years of age and older received significantly higher marks

Table 8

Effects of Gender on Course Grade

	t-test for Independent Samples of Gender			
Variable	Number of Cases	Mean	Standard Deviation	SE of Mean
Grade				
Female	149	76.7987	11.405	.934
Male	92	70.7391	13.487	1.406

Mean Difference = 6.0595, t = 3.59, p < .001

Table 9

Effects of Selected Teacher and Student Variables on Course Grade

	ANOVA Model 2				
Source	Sum of Squares	df	Mean Square	F	p
Main Effects	789.826	4	197.456	1.284	.277
Learning Style	320.576	3	106.859	0.695	.556
Match/Mismatch	671.535	1	671.535	4.367	.038
2-Way Interactions	694.740	3	231.580	1.506	.214
Learning Style x Match/Mismatch	694.740	3	231.580	1.506	.214

than did their younger peers. In addition, female students received higher grades than male students in the sample population excluding the Business Program where there was a fairly equal distribution of both gender and grades received.

There were no significant relationships found between teaching style and learning styles, teaching style and age group, and learning style and age group, and subsequent grades assigned. There was also no significant relationship between learning style and grades received, and learning style and match/mismatch and grades received by the student sample.

There was a significant relationship between student/teacher learning style match/mismatch ($F = 4.367$, $p = .038$); however, Duncan's multiple range test and Chi-square analyses did not substantiate this relationship.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of the study was to investigate the relationship between learning styles and academic achievement in postsecondary education. The study was completed at Georgian College of Applied Arts and Technology located in the Province of Ontario.

Learning style inventories and subsequent research have received significant attention in the realm of education. Many support that individuals learn best when they are taught in a manner that matches their own individual learning style. Mary J. Thompson and Terrance P. O'Brien completed a research study in an American college to explore the relationships between learning style and academic achievement. The dependent variable of academic achievement was measured through student grades. Indpendent variables included student learning styles, teacher style, student gender, student age and the teacher/student match/mismatch of learning styles. The most significant outcome was that their study did not support the majority of research in the area of

teacher/learner match and academic achievement. Thompson and O'Brien recommended that there be further research because of their results.

The research completed by Thompson and O'Brien was duplicated at Georgian College of Applied Arts and Technology in the Province of Ontario. Learning style research, and any other tools that can assist teachers at the community college level, are critical at this time. Statistics from the community college system in Ontario indicate that the chronological age and the gender of students has changed. The system is now servicing older students who often place high expectations on themselves, the teacher and the educational institution. Teachers now struggle to provide quality education to a student body that they historically have not serviced (colleges were established to service grade 12 graduates who often wanted skills training). This is further compounded by the reality that a significant number of college teachers were hired without formal teacher training and experience.

The literature review in Chapter Two reviewed the use of learning style inventories in education from many angles. An historical framework of education was introduced including the present statistics

from the community college system in the Province of Ontario. The use of learning style theories when discussing adult learning principles and theory was also considered. Teacher training and classroom effectiveness were related to learning style theories. Applied research using learning styles theories in postsecondary education was also included in the review. In all subject areas, learning style inventories for the most part were considered to be a valuable tool to assist teachers and students.

Chapter Three detailed the research methodology and procedures. The research design of the field experiment completed at Georgian College of Applied Arts and Technology attempted as much as possible to duplicate the original study completed by Thompson and O'Brien. Sampling, instrumentation and data collecting and recording were very similiar in both studies.

The limitations section of the study focused on the concern that learning style was the only factor being considered when measuring academic achievement. The literature review in Chapter Two and the limitations section of Chapter Three detailed many other elements that have an impact on academic achievement. It is critical that all elements be considered when reflecting on the results of the reseach.

Chapter Four focused on the findings of the study and their relationship to the results of the original research by Thompson and O'Brien. There were common results that merit further discussion and provide credibility to both studies. They will be included in Chapter Five. Overall the research was worth duplicating because of the results. Even though the sample was small in both studies, the research in most cases supported each other.

Comparative Analysis

This section was included to compare the original research results completed by Thompson and O'Brien (1991) in the United States with the results of the research completed at Georgian College of Applied Arts and Technology in Ontario. The sample population in the original study included 207 students and 16 teachers. Fifty-eight percent of the sample were females and 42% of the sample were males. Seventy-one percent of the sample were under the age of 25 and 29% were 25 years of age and older. The learning style breakdown included 35% of the sample who functioned in the Concrete Sequential channel and 12% in the Abstract

Sequential mode. Twenty-three percent were Abstract Random and 19% were Concrete Random. The balance of 11% were classfied as bi-modal as they had two identical scores on two channels.

In the current study at Georgian College, the sample included 243 students and 18 teachers. Sixty-two percent of the sample were of the female gender and 38% were males. Seventy-two percent of the participants were 25 years of age and younger, while 28% were over 25. Concrete Sequential was the dominant learning style representing 42% of the sample. Eleven percent had an Abstract Sequential learning style and 26% operated within the Abstract Random channel. The balance of 21% percent were ranked as Concrete Random. It was interesting to note that the breakdown of the sample in all classifications was very similiar (gender, age and learning style).

The research occurred at two different campuses of an educational institution in both studies. The teachers and the students sampled were administered the Gregorc Style Delineator and their scores were recorded in a similiar manner. Both studies used the same data analyses to review the results. There were similiar findings in both studies that supported to the validity and reliability of the original research completed by

Thompson and O'Brien (1991).

In the first ANOVA model considered in the research at Georgian College of Applied Arts and Technology, significant main effects were manifested in regard to the teaching style, age group and gender. With the exception of gender, these findings are very similiar to those of the original study. Again, exactly as in the original study, Duncan's multiple range test revealed that Concrete Sequential teachers assigned significantly lower grades than did teachers dominant in any of the other three styles. Post hoc testing also revealed that students 25 years of age and older received significantly higher grades than did younger students which supports the findings in the original research. Contrary to the original study, no significant interaction effects were found between teaching style and age group, or any other variables in the first model.

In the second ANOVA Model , the results that explored main effects between student learning style and academic grades both showed no significant relationship. There were, however, clear contradictory results when discussing match/mismatch and academic grades and two-way interactions between learning style and match/mismatch and academic grades received. In the Thompson and O,Brien results, there was no

significant relationship between teacher match/mismatch ($p = .21$), where as the Georgian study revealed a significant relationship ($p = .038$). As discussed earlier, subsequent analyses completed by Duncan's multiple range test and Chi-square, did not substantiate the relationship. Student style and teacher match/mismatch in the Thompson and O'Brien study did indicate a significant effect ($p = .05$) in comparison to the findings in the Georgian study ($p = .214$).

To conclude, there were some common findings when comparing both studies. One can state with confidence that there appear to be significant findings regarding age group of students, teaching style and their affect on academic grading. Both research studies supported there were no significant relationships between learning style and academic grading, teaching style and learning style with grades, and student learning style and teacher match/mismatch on course grades. Although there were no significant relationships, there appears to be a possible trend with the variables. Further analyses, possibly utilizing META analysis, could be explored to identify any potential significant relationships. Contrary research results were in the area of student gender and course grades, teaching style and age groups with course

grade, teaching style and student gender with course grades, teacher match/mismatch with course grade and student style and teacher match/mismatch with course grades. It is recommended that a larger sample be used to determine if the contrasting of results were related to sample size with a particular focus on ensuring that there is a cross sample of teachers with learning styles from all four channels. This may have contributed to the Georgian research as there was not equal representation from all four learning styles. Equal representation was present in the original research.

Conclusion

As discussed earlier, the purpose of the study was to determine whether learning styles affected academic grading, and ultimately, student success, in postsecondary education. It was the intent of the study to establish if there were a relationship between student learning style, teacher style, learner/teacher matching and/or mismatching, student gender, and age, to the academic grades of students. Six research questions focusing on each of the independent variables were outlined in

Chapter One. Each research question will be addressed in this section. The results will be related to the demands placed on the community college system, changing student demographics, adult learning principles, teacher training and classroom efffectiveness and applied research in the field.

Question number one addressed the area of distribution of grades and learning/teaching style of the teacher. As detailed in Table 4, teachers with a Concrete Sequential teaching style assigned significantly lower grades in comparison to their colleagues. This mirrored the findings in the Thompson and O'Brien study. Individuals who are Concrete Sequential learners tend to be very black and white in their thought orientation. They view the world mainly through their physical senses and their ordering ability is very linear and logical. Personal proof from experts is required to validate thoughts and concepts, and they tend to be conservative in their approach to their lives and change. Teachers who have a Concrete Sequential predominant style are very results oriented and rely on concrete examples. They are very structured and have a strict orientation to time (Butler, 1982).

It is not surprising when reviewing the above characteristics of this

style that student grades would be lower. This style does not foster independent and creative thought processes. One could assume that the instructional delivery would be somewhat autocratic and diversity of thought by the student would not be appreciated. As people mature chronologically, most gain an appreciation for the greyness in life. Adult learning principles support the acceptance of individual differences and acknowledgement of life and work experiences. They also support flexible delivery of curriculum that meets the needs of a diverse group of students. Adult learners want material that they can relate to and which is of value to the learner. This quite possibly would not be supported by a teacher operating from this channel. It would be safe to assume that a Concrete Sequential teacher would not adjust the curriculum to meet the needs of the student being serviced. Most adult learners would not do well in a class with such limitations. This would ultimately be reflected in the grade received.

Vision 2000 (Ontario Council of Regents, 1990) suggested that students who graduated from the community college system in the past possessed limited critical thinking skills. Employers who were interviewed for this report believed that colleges should increase the

general education and critical thinking components in the curriuculum, to promote employee flexibility and creativity. A Concrete Sequential teacher would possibly have difficulty with such curriculum. One would hope that additional staff development could be recommended to assist such teachers with the understanding of learning style theory, curriculum development and delivery, and its effect on student success.

Question 2 addressed the relationship between academic grade and student learning style. There was no significant relationship found between the two variables in both studies. One could recommend that a larger sample be used to establish if there is a relationship. If in fact there is no relationship, it certainly stresses the importance of the teachers' role and their learning style with academic grades. As detailed earlier, teachers with a Concrete Sequential learning style in both studies gave lower grades to students.

In both studies, there was a significant relationship between age grouping and grades received. Students 25 years of age and older received significantly higher grades than their younger colleagues (Table 2 and Table 6). This would not come as a surprise to any teacher working in adult education. There is often more at stake for non-

traditional students when returning to school (family and financial responsibilities). Their in-class attendance is usually higher and their motivation to learn is piqued. Education to non-traditional students is very much a means to a specific end, that often being employment.

Traditional students when coming to college for the first time are often distracted by the change in their social status. For the majority, this is their first time away from home and they are challenged by their new found independence. Most do not have family and financial responsibilities and academia may be only one of their focuses. This certainly does not apply to all traditional students; however, a generalization can be made.

The above significant effect is very important to the college system. As detailed in Appendix A and Appendix B, student demographics are consistently changing. The college system has seen a steady increase in non-traditional students. Attrition programs have recently focused on non-traditional students as they are a relatively new anomaly to the college system. If they, in effect, receive higher grades on a consistent basis, colleges may have to alter the retention focus to the traditional student. Further research is recommended in this area to explore the

relationship between age and academic achievement. One could speculate on a number of factors that could contribute to the relationship, however it would be helpful if factors could be validated through statistical analyses. Academic grades and student age address question number 3.

There was a significant relationship between gender and grade received in both studies. Females consistently received a higher grade than males as indicated in Table 5 and Table 8. Although this has proved to be significant, one should reflect on the program sample. The programs included in the study were Civil Aviation, Office Administration, Interim Semester, Law and Security Administration, Nursing, Business and Dental Hygiene. As discussed previously, Office Administration, Nursing and Dental Hygiene are female dominated programs. They are also programs that attract a large number of non-traditional students (over 25 years of age). Further, the Nursing and Dental Hygiene programs are over-subscribed programs with very high admission standards. Both programs require students to take pre-admission testing that screens potential candidates. At Georgian College, students in the programs used in the sample are recognized as students who are academic achievers.

The male dominated programs in the sample included Civil Aviation and Law and Security Administration. Both programs do not have seating limits and tend to attract young males who have recently graduated from high school. They meet the general admission requirements for the college and do not have intensive program specific requirements.

Although one could generalize that females at all levels of education receive higher grades than their male colleagues, further research is recommended using a broad based sample to confirm the significant relationship. The relationship between gender and grade addresses question 4 in Chapter One.

Question number five addressed two-way interactions between teaching style and learning style, teaching style and age group, and learning style and age group on the assigning of grades by teachers. All the interactions showed no significant relationships. From these results, and other findings in the research, it appears that teacher style, combined with more than one variable, has little significance on academic achievement. Again, a recommendation for a larger teacher and student sample may provide a significant relationship.

The most significant results were found when answering question 6. Past research, as detailed in Chapter Two, supported a relationship between academic achievement and student learning style and teacher match/mismatch. Learning style theorists argue that when a teacher and a learner have a similiar learning style, the student will receive significantly higher grades than when there is a mismatch. In Table 9, there was a significant effect found ($p = .038$). Duncan's multiple range test and Chi-square analyses did not substantiate the relationship when further analyses were completed. The second analysis supported the findings in the original study by Thompson and O'Brien. A larger sample may be helpful to determine if the sample size restricted the outcome. If, however, the findings are substantiated, one again has to question the role of the individual teaching/learning style of the teacher.

Other variables that could have affected the dependent variable of grade may be a consideration. As detailed earlier, there are many factors that affect grades (intelligence, motivation of teacher and learner, time of day and year, environmental factors, subject being taught). Further, teachers in the sample may have taught in the four modes of learning, thus accommodating the majority of students in the class. Many of the

sample teachers did have several years teaching experience and the majority had some form of teacher training. Literature supports that the best leaders and teachers are individuals who can address a group using different teaching/learning channels. It is quite possible that the teacher sample interacted in such a fashion. All of the above factors may have affected academic grades.

Recommendations

Chapters Four and Five have discussed some of the implications of the research. The research findings in the study at Georgian College of Applied Arts and Technology substantiated much of the research results in the original study completed by Thompson and O'Brien (1991). Both research studies did not support a relationship between academic achievement and the match/mismatch of learning styles between student and teacher.

Although the research did not support the relationship between academic achievement and learning style match/mismatch, the application of learning style inventories and theory can be of benefit to both teachers

and students at the postsecondary level. As individuals, teachers and students should be aware of learning style theory and have the opportunity to have their learning style assessed. The research did support that the majority of individuals have a learning style preference and it is critical that teachers are aware that individuals have different learning styles. This is essential as teachers can learn to adapt their delivery in the classroom to meet the learning style needs of a variety of students. This is especially critical for teachers who operate in the Concrete Sequential learning style channel as there were significant grading implications for students. Learning style theory training should become a part of internal staff development programs as well as external programs (B.Ed. and M.Ed. programs). Students when aware of their dominant learning style can advocate for themselves when requiring alternative modes of instruction or clarification, with a sense of confidence and understanding. This in itself, should assist with academic achievement as students could be knowledgeable consumers of education.

Colleges should revisit their retention programs for all age categories but in particular those students under the age of 25. The results of the study indicated that students 25 years of age and over received

significantly higher grades. Motivational factors with this age group may be both intrinsic and extrinsic. Quite possibly students under 25 years of age may not have developed to this level and may require increased institutional support to enhance academic achievement.

Feedback from students and teachers when using the Gregorc Style Delineator was positive. It would however be beneficial to have a Word Guide that explains that words used in the Gregorc Style Delineator to reduce the chance of misinterpretation when completing the work matrix. This was a concern of the researcher when administering the Gregorc Style Delineator to the student sample.

It is also essential that students are aware of their own learning style and the learning styles of other people (peers and teachers). Students can then advocate on behalf of themselves when not understanding curriculum because of the manner in which it is being delivered. It would also assist students when working with peers on group projects.

The small sample size may have affected the results of the research. Consequently, further research is warranted using a larger teacher and student sample. It should be noted however that the use of learning style inventories in the postsecondary realm could assist community colleges to

meet student, curriculum, program and government intiatitive needs. The Gregorc Style Delineator proved to be a valuable tool to assess the learning styles of the sample population. With the addition of a word guide, this inventory provides a user-friendly, cost and time effective mechanism for the college system.

References

Archer, J. Jr. (1991). Counselling college students - A practical guide for teachers, parents and counsellors. New York: The Continuum Publishing Company.

Bargar, R. R. & Hoover, R. L. (1988). Psychological type and the matching of cognitive styles. In Charles M. Galloway (Ed.), Theory into practice...Matching teaching and learning styles. Journal of the College of Education, 23(1), 56-63.

Bath, J. B. & Blais, K. (1993). Learning style as a predictor of drug dosage calculation ability. Nurse Educator, 18 (1), 33-36.

Brundage, D. & MacKeracher, D. (1980). Adult learning principles and their application to program planning. Toronto: Ministry of Education.

Cronbach, L.J. & Snow, R.E. (1977). Aptitudes and instructional methods: A handbook for research on interactions. New York: Irvington Publishers.

Dewey, J. (1963). Education and experience. (Reprint of Collier McMillan, 1938). New York: Collier Books.

Dixon, N. (1982, July). Incorporating learning style into training design. Training Development Journal.

Doyle, W., & Rutherford, B. (1984). Classroom research on matching learning and teaching styles. In Charles M. Galloway (Ed.), Theory into practice...Matching teaching and learning styles. Journal of the College of Education, 23(1), 20-25.

Dunn, R. (1983). Teaching students through their individual learning styles: A research report. In J.W. Keefe (Ed.), Student learning styles and brain behavior, (pp. 142-151). Reston, Virginia: National Association of Secondary School Principlals.

Edwards, S. A. & Barnes, S. (1985). A research based staff development model that works. Educational Leadership, 42(7), 54-56.

Fenstermacher, G. & Soltis, J. (1986). Approaches to teaching. New York: Teachers College Press. Columbia University.

Finklestein, M.J. (1984). The American academic professor. Columbus Ohio: State University Press.

Gibson, C., & Graff, A. O. (1992). Impact of adults' preferred learning styles and perception of barriers on completion of external baccalaureate degree programs. Journal of Distance Education,

7(l), 39-51.

Gregorc, A. F. (1982a). An adult's guide to style. Maynard, MA: Gabriel Systems, Inc.

Gregorc, A. F. (1982b). Gregorc style delineator. Maynard, MA: Gabriel Systems, Inc.

Gregorc, A. F. (1982c). Gregorc style delineator: Development, technical, and administrative manual. Maynard, MA: Gabriel Systems, Inc.

Haugen, R. E. (1984). Educationist and academics: Ratings of community college instructors. Community Junior College: Quarterly Research and Practice, 8(1-4), 103-113.

Henson, K. T., and Borthwork, P. (1984). Matching styles: A historical look. In Charles M. Galloway (Ed.), Theory into practice... Matching teaching and learning styles. Journal of the College of Education, 23(1), 3-9.

Houle, C. (1984). Patterns of learning. San Francisco: Jossey-Bass Publishers.

Huff, P., Snider, R. & Stephenson, S. (1986). Teaching and learning styles--Celebrating differences. Toronto: Ontario Secondary School

Teachers Federation.

Hunt, D. (1986). Beginning with ourselves: In practice, theory and human affairs. Cambridge, MA: Brookline Books.

Hunt, D. & Gow, J. (1984). How to be your own best theorist II. In Charles M. Galloway (Ed.), Theory in practice-- Matching teaching and learning styles. Journal of the College of Education, 23(1), 64-71.

Hyman, R. & Rossoff, B. (1984). Matching learning and teaching styles: The jug and what's in it. In Charles M. Galloway (Ed.), Theory into practice...Matching teaching and learning styles. Journal of the College of Education, 23,(1), 35-43.

Jackson, P.W. (1986). The practice of teaching. New York: Teachers College Press.

Jones, J. W. and Duffy, D. K. (1991). Activating learning in the classroom: Challenge, collaborate, celebrate. The Journal of Staff, Program, and Organizational Development, 9(4), 231-237.

Joyce, B. and Weil, M. (1992). Models of teaching. New Jersey: Prentice -Hall.

Joyce, B.R. (1984). Dynamic disequilibrium: The intelligence of

growth. In Charles M. Galloway (Ed.), Theory into practice...Matching teaching and learning styles. Journal of the College of Education, 23(1), 26-34.

Kampwirth, T.J., & Bates, M. (1980). Modality preference and teaching methods: A review of the literature. Academic Therapy, 15, 597-605.

Keller, J. W. and Rabold, F. L. (1990). The importance of teacher behaviours in the classroom. Journal of Staff, Program and Organizational Development, 8(3), 161-166.

Knowles, M. (1970). The modern practice of adult education -- Androgogy versus pedagogy. New York: Association Press.

Knowles, M. (1973). The adult learner: A neglected species. Houston, Texas: Gulf Publishing Company.

Knudson, R.S. (1980, April). An alternative approach to the androgogy/pedogogy issue. Lifelong Learning. The Adult Years, 8-10.

Kolb, D. (1984). Experiential learning--Experience as the source of learning and development. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Kolb, D.A., & McIntyre, J.M. (1979). Organizational psychology: An experiential approach (3rd ed.). Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Martin, B. B. (1987). Developing a learning-teaching style scheme to improve teaching behaviours of college child development student interns. Unpublished doctoral dissertation, Nova University.

Mezirow, J. (1981). A critical theory of adult learning and education. Lifelong Learning: The Adult Years and Adult Education, 32(1), 3-24.

National Association of Secondary School Principals. (1982). Student learning styles and brain behavior. Reston, Virginia: NASSP.

Nunes, S. A. & Halloran, T. F. (1987). Elements for training design: An assessment of competencies for effective ABE instructors (Tech.Rep. No. 143). Florida: Miami-Dade Community College, Centre for Adult Education.

Ontario Council of Regents. (1990). Vision 2000: Quality and opportunity--A summary. (ISBN 0-7729-7208-7). Toronto: Ministry of Colleges and Universities.

Ontario Council of Regents. (1992). The college standards and accreditation council: A discussion paper of the CSAC establishment board. Toronto: Ontario Council of Regents for Colleges of Applied Arts and Technology.

Ontario Council of Regents Prior Learning Assessment Advisory Committee. (1992). Prior learning assessment: Enhancing the access of adult learners to Ontario's colleges. Toronto: Ontario Council of Regents for Colleges of Applied Arts and Technology.

Parrot, A. (1987). Is Queen Victoria lecturing today? Teaching human sexuality using famous personalities. Teaching Sociology, 15, 257-262.

Peterson, P.L. (1979). Direct instruction reconsidered. In P.L. Peterson & H.J. Walberg (Ed.), Research on teaching. Berkeley, CA: McCutchan, 57-69.

Pine, G.J. and Horne, P. J. (1969, October). Principles and conditions for learning in adult education. Adult Leadership, 108-113.

Robinson, S. (1993). College enrolments for the past ten years. Toronto: Ontario Ministry of Education and Training.

Saul, J.R. (1990). Can community colleges provide the training for

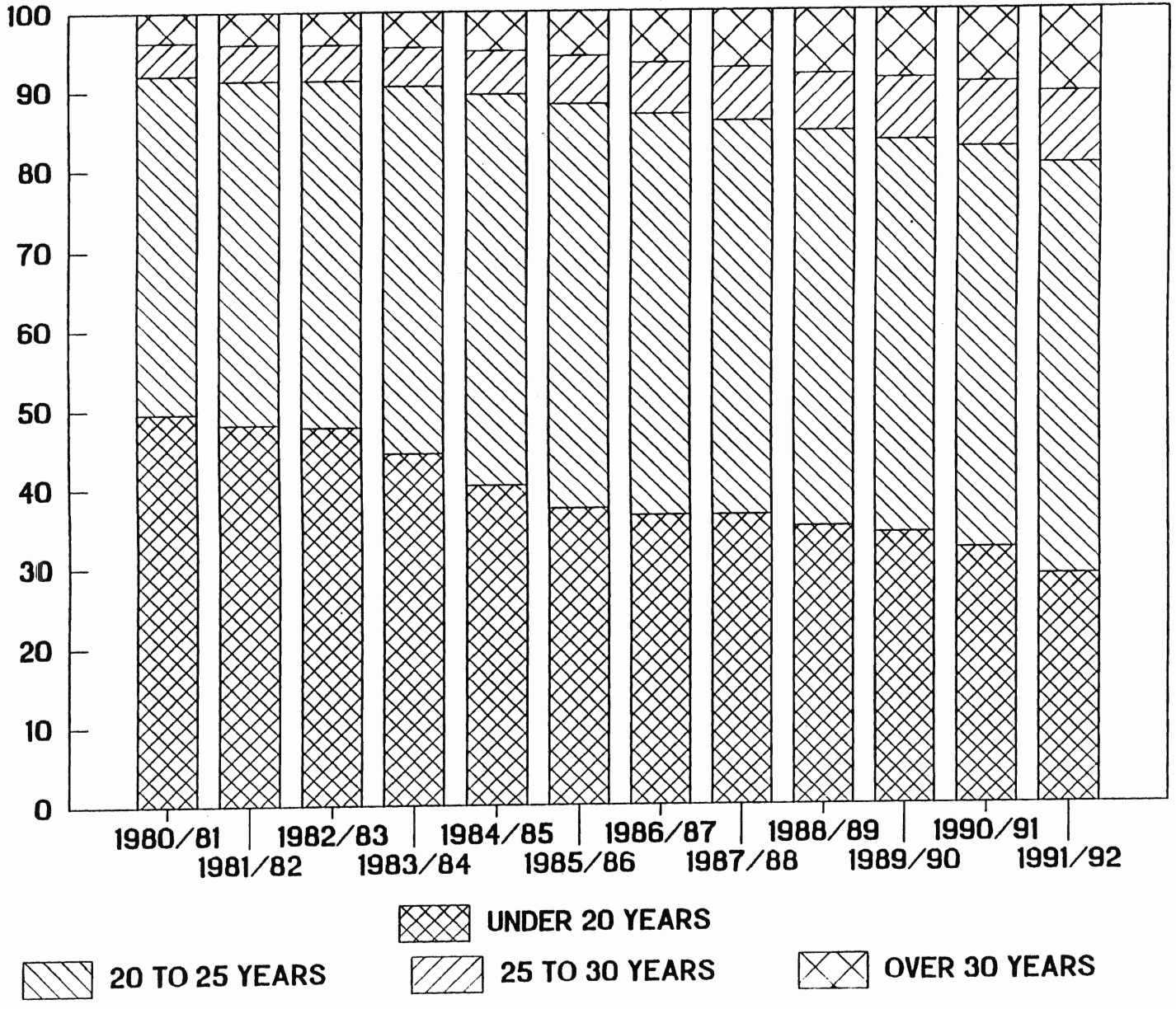
educators of adults? Community College Review, 18(3), 51-57.

Thompson, M. J. & O'Brien, T.P. (1991, April). Learning styles and achievement in postsecondary classrooms. Paper presented at the Annual Conference of the American Educational Research Association, Chicago, Illinois.

Wells, D. & Higgs, Z.R. (1990). Learning styles and learning preferences of first and fourth semester baccalaureate degree nursing students. Journal of Nursing Education, 29(9), 385-390.

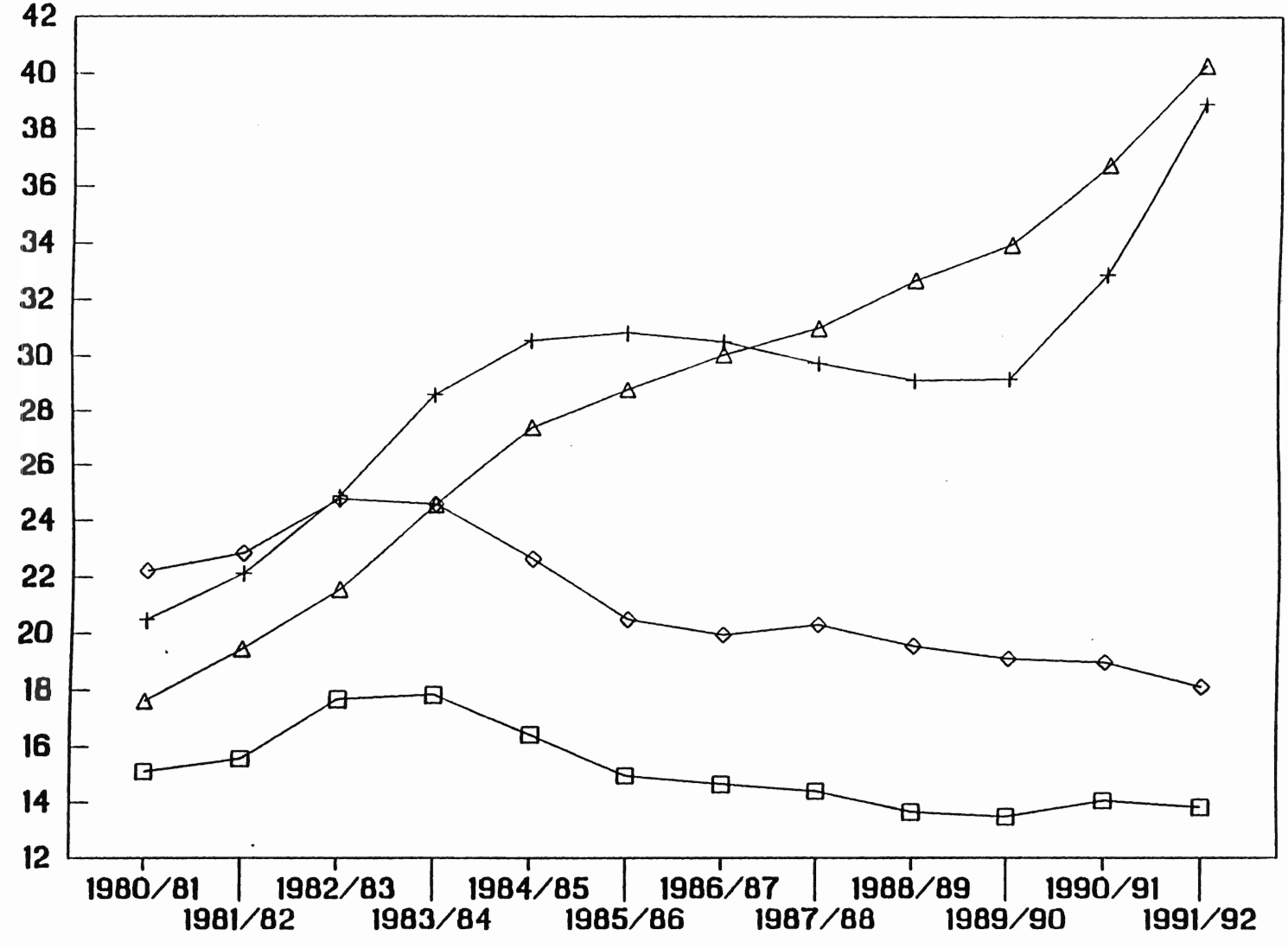
AGE DISTRIBUTION %

ONTARIO COLLEGES 1980 - 1992



AGE AND GENDER DISTRIBUTION

ONTARIO COLLEGES 1980 - 1992



March 1, 1994

GEORGIAN COLLEGE OF APPLIED ARTS & TECHNOLOGY

E CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
TOR: B. GORDON								
gn Arts Foundation	2	0	0	0	0	0	2	0
gn Fd(Jan Intake)	1	4	0	0	0	0	1	4
tive Arts	0	0	1	0	1	0	2	0
hic Design	0	0	1	0	1	0	2	0
strial Design	0	0	0	0	0	1	0	1
rior Design	0	0	0	0	1	0	1	0
llery/Metals(Jan)	1	0	0	0	0	0	1	0
nary Management	1	0	0	0	0	0	1	0
rism-Foundation	1	1	0	0	0	0	1	1
r Found (Jan. Int)	1	1	0	0	0	0	1	1
el & Resort Oper	0	0	1	0	0	0	1	0
el & Resort Admin	0	0	0	0	0	0	0	0
rism Management	0	0	0	0	0	1	0	1
TOTAL	7	6	3	0	3	2	13	8
ESENT COMPARISON (%)	-14.3%						-38.5%	

RECTOR: G. HIGGINSON

vil Aviation-Found	4	4			0	0	4	4
& Security Admin	0	4	2	0			2	4
rice Admin - General	0	0					0	0
f Ad - Legal Diploma	0	0	0	1			0	1
f Ad-Medical Diploma	0	0	0	0			0	0
TOTAL	4	8	2	1	0	0	6	9
COMPARISON (%)	100.0%						50.0%	

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
TOR: B. GORDON								
gn Arts Foundation	6	9					6	9
gn Fd(Jan Intake)	0	4					0	4
tive Arts			8	7	3	4	11	11
hic Design			4	10	0	3	4	13
strial Design			1	1	1	1	2	2
rior Design			4	3	1	0	5	3
llery/Metals(Jan)	0	1	3	1	1	2	4	4
nary Management	1	0	0	1			1	1
rism-Foundation	0	2					0	2
r Found (Jan. Int)	1	1					1	1
el & Resort Oper			6	4			6	4
el & Resort Admin					0	1	0	1
rism Management			1	2	1	0	2	2
TOTAL	8	17	27	29	7	11	42	57
ESENT COMPARISON (%)	112.5%		7.4%		57.1%		35.7%	

RECTOR: G. HIGGINSON

vil Aviation-Found	2	0			1	3	3	3
& Security Admin	4	2	8	9			12	11
rice Admin - General	0	1					0	1
f Ad - Legal Diploma	2	1	3	0			5	1
f Ad-Medical Diploma	0	1	0	1			0	2
TOTAL	8	5	11	10	1	3	20	18
COMPARISON (%)	-37.5%		-9.1%		200.0%		-10.0%	

Appendix C

March 1, 1994

GEORGIAN COLLEGE OF APPLIED ARTS & TECHNOLOGY

E CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
CTOR: M. HILL								
rtising	3	1	0	1			3	2
uter Prog/Analyst	1	0			0	0	1	0
Admin-Auto Mrktg	0	1			0	2	0	3
Admin-Auto Mrktg F	0	0			0	0	0	0
TOTAL	4	2	0	1	0	2	4	5
SENT COMPARISON (%)								

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
	1	2	6	4			7	6
	3	4	4			4	7	8
	0	5			4	4	4	9
	0	0			1	1	1	1
	4	11	10	4	5	9	19	24
	175.0%		-60.0%		80.0%		26.3%	

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
RECTOR: F. RUEMPER								
hthalmic Dispenser	0	0	0	0			0	0
neral Arts & Science	1	1	0	0			1	1
n. Arts & Sci. Interim	0	2					0	2
alth Sci Found (GAS)	3	2					3	2
rsing	1	2	0	2	0	0	1	4
UBTOTAL	5	7	0	2	0	0	5	9
RESENT COMPARISON (%)	40.0%						80.0%	

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
	0	0	0	1			0	1
	1	0	1	3			2	3
	0	0					0	0
	0	5					0	5
	0	3	0	7	1	0	1	10
	1	8	1	11	1	0	3	19
	700.0%		1000.0%				533.3%	

:: March 1, 1994

GEORGIAN COLLEGE OF APPLIED ARTS & TECHNOLOGY

RIE CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

ECTOR: A. SHAMA	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
il/Environmental	0	1					0	1
//Env (Jan. Intake)	3	2					3	2
vey Tn (Sem. 2)	0	0					0	0
vey Tn (Sem. 3)			0	0			0	0
vey Tn (Sem. 4)			0	1			0	1
vil Eng Technician			0	0			0	0
vil Eng Ty-Mun			0	0	0	0	0	0
vironmental Ty			0	0	0	2	0	2
ectrical Eng Tn	5	1	0	0			5	1
ectrical Eng Ty			0	0	1	1	1	1
ectronics Eng Tn	1	1	0	0			1	1
lectronics Eng Ty			0	0	0	0	0	0
chanical Eng Tn-Ind	1	0	0	0			1	0
chanical Eng Tn-Dft	0	2	0	0			0	2
ch Eng Tn-Tool & Die	0	0	0	0			0	0
chanical Eng Ty			0	0	0	0	0	0
IBTOTAL	10	7	0	1	1	3	11	11
RESENT COMPARISON (%)	-30.0%				200.0%		0.0%	

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
	2	1					2	1
	0	2					0	2
	0	3					0	3
			0	0			0	0
			1	0			1	0
			1	8			1	8
					3	3	3	3
			0	1	0	1	0	2
	1	6	0	0			1	6
					0	1	0	1
	8	8	0	0			8	8
					2	1	2	1
	1	1	0	0			1	1
	3	2	0	0			3	2
	0	0	0	0			0	0
					1	3	1	3
	15	23	2	9	6	9	23	41
	53.3%		350.0%		50.0%		78.3%	

e: March 1, 1994

GEORGIAN COLLEGE OF APPLIED ARTS & TECHNOLOGY

RIE CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
ECTOR: M. WOLFE	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
siness-Foundation	1	4					1	4
S Found (Jan Intake)	6	3					6	3
siness (General)							0	0
siness-Accounting							0	0
siness-Marketing							0	0
siness Admin					0	1	0	1
s Admin-Accounting					0	1	0	1
s Admin-Marketing					0	0	0	0
search Analyst	1	0					1	0
UBTOTAL	8	7	0	0	0	2	8	9
RESENT COMPARISON (%)	-12.5%						12.5%	
CAMPUS TOTAL	38	37	5	5	4	9	47	51
PRESENT COMPARISON (%)	-2.6%				125.0%		8.5%	

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
	6	5					6	5
	1	4					1	4
							0	0
							0	0
							0	0
					3	0	3	0
					5	4	5	4
					2	3	2	3
	0	0					0	0
	7	9	0	0	10	7	17	16
	28.6%				-30.0%		-5.9%	
	43	73	51	63	30	39	124	175
	69.8%		23.5%		30.0%		41.1%	

: March 1, 1994 GEORGIAN COLLEGE OF APPLIED ARTS & TECHNOLOGY

LIA CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
:CTOR: A. MCCULLOUGH								
n Disorder Assist	0	0					0	0
elop Services Wrkr	3	3	1	2			4	5
ly Childhood Educ	0	0	0	0			0	0
rapeutic Recreation	0	0					0	0
iness-Foundation	1	1					1	1
iness (General)							0	0
iness-Accounting							0	0
iness-Marketing							0	0
BTOTAL	4	4	1	2	0	0	5	6
ESENT COMPARISON (%)	0.0%		100.0%				20.0%	
RECTOR: C. SIMPSON								
ntal Assistant	0	2					0	2
ntal Hygiene			0	0			0	0
rsing	5	0	1	0	0	0	6	0
rsing Assistant	1	1					1	1
arine Tech Recreation	0	1	1	0	0	0	1	1
UBTOTAL	6	4	2	0	0	0	8	4
RESENT COMPARISON (%)	-33.3%						-50.0%	
CAMPUS TOTAL**	10	8	3	2	0	0	13	10
ESENT COMPARISON (%)	-20.0%		-33.3%				-23.1%	

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
	0	0	0	0			0	0
	3	6	4	7			7	13
	7	5	9	10			16	15
	1	1					1	1
	6	8					6	8
							0	0
							0	0
							0	0
	17	20	13	17	0	0	30	37
	17.6%		30.8%				23.3%	
	0	3					0	3
			1	0			1	0
	4	2	0	8	0	0	4	10
	0	0					0	0
	0	2	0	0	0	0	0	2
	4	7	1	8	0	0	5	15
	75.0%		700.0%				200.0%	
	21	27	14	25	0	0	35	52
	28.6%		78.6%				48.6%	

: March 1, 1994
SOUND CAMPUS

GEORGIAN COLLEGE OF APPLIED ARTS & TECHNOLOGY

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
CTOR: A. WOODFORD								
sing (Modified)			1			0	1	0
eral Arts & Science	0	0					0	0
ly Childhood Asst.	0	2					0	2
sing Assistant	0	1					0	1
ign Arts Foundation	0	0					0	0
ative Arts			0	0			0	0
phic Design			0	0			0	0
ine Eng Technology	0	1	1	0	0	0	1	1
ine Ty - Navigation	0	2	0	1	0	0	0	3
BTOTAL	0	6	2	1	0	0	2	7
ESENT COMPARISON (%)			-50.0%				250.0%	
RECTOR: G. BOYDELL								
siness-Foundation	2	1					2	1
siness (General)							0	0
siness-Accounting							0	0
siness-Marketing							0	0
siness Admin					0	0	0	0
siness Admin-Acctg					0	1	0	1
siness Admin-Mktg					0	0	0	0
puter Programmer	1	0					1	0
fice Admin - General	0	0					0	0
f Ad - Legal Diploma	0	0	0	0			0	0
f Ad - Executive	0	0	0	0			0	0
& Security Admin	2	0	0	0			2	0
.....	5	1	0	0	0	1	5	2

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
			0			0	0	0
	1	0					1	0
	2	3					2	3
	0	0					0	0
	7	5					7	5
			1	0			1	0
			1	1			1	1
	2	0	1	1	2	2	5	3
	0	0	0	0	0	0	0	0
	12	8	3	2	2	2	17	12
	-33.3%		-33.3%		0.0%		-29.4%	
	7	5					7	5
							0	0
							0	0
							0	0
					2	1	2	1
					0	0	0	0
					0	0	0	0
	1	1					1	1
	0	1					0	1
	0	0	0	0			0	0
	0	0	0	0			0	0
	1	2	4	2			5	4
	9	9	4	2	2	1	15	12

N SOUND CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
CAMPUS TOTAL**	5	7	2	1	0	1	7	9
RESENT COMPARISON (%)	40.0%		-50.0%				28.6%	
COLLEGE TOTAL	53	52	10	8	4	10	67	70
RESENT COMPARISON (%)	-1.9%		-20.0%		150.0%		4.5%	

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
CAMPUS TOTAL**	21	17	7	4	4	3	32	24
RESENT COMPARISON (%)	-19.0%		-42.9%		-25.0%		-25.0%	
COLLEGE TOTAL	85	117	72	92	34	42	191	251
RESENT COMPARISON (%)	37.6%		27.8%		23.5%		31.4%	

Appendix D

The Gregorc Style Delineator

Name of Faculty:_____ Program:_____
Semester:_____ Age:_____
Gender:_____

1↓	2↓	3↓	4↓	5↓
Objective	Perfectionist	Solid	Practical	Careful with detail
Evaluate	Research	Quality	Rational	Ideas
Sensitive	Colorful	Non-judgemental	Lively	Aware
Intuitive	Risk-Taker	insightful	Perceptive	Creative
6↓	**7↓**	**8↓**	**9↓**	**10↓**
Thorough	Realistic	Ordered	Persistent	Product oriented
Logical	Referential	Proof	Analytical	Judge
Spontaneous	Empathy	Attuned	Aesthetic	Person Oriented
Trouble Shooter	Innovative	Multi-solutions	Experimenting	Practical Dreamer

a.	b.	c.	d.

Appendix E

March 23, 1994

TO ALL FACULTY:

I am currently in the final stages of completing my Masters of Education Program through Brock University. A thesis is a completion requirement and I have chosen to explore the relationship between learning and teaching style to student grades. Student age and gender will also be included in the analysis.

Faculty from all program areas at the Orillia campus are being asked to complete the Gregoric Style Delineator (a learning style inventory) to determine your own learning style. Should you demonstrate a strong preference for one style of learning you will be used as part of the research sample. This will only require that I go into one class of your choice for a maximum of 15 minutes to administer the same inventory to your class. If you would prefer to administer the inventory yourself that would also be an option. I would then require a copy of that class's final grades to analyze the relationship. I will provide for you, and your students, a comprehensive interpretation of one's learning style for your personal use.

Attached is the word matrix that determines your learning style. You only have to rank each columum (10 in total) using the numbers 1 to 4 to indicate the words that best describe how you feel they relate to you. 4 is the word that best describes you and 1 is the work that least describes you. You must ramk each word with a number in order for the results to be valid (go with your gut reaction). Your ranking should be your first impression as this process is recommended to take only four minutes to complete.

Your generosity in sharing your time at this very busy time of year is much appreciated. All responses will be treated with both anonymity and confidentiality. I plan to present the overall results of the research during a session at Georgian Day. Please return the completed Matrix to Pat Dobson by 4.30 on Monday April 11, 1994. I will be available to go into your classroom anytime on Wednesday, Thursday, or Friday (April 13-15, 1994). Please indicate on the bottom of your Matrix your preference.

Thank you in advance for your cooperation. If you have any question please feel free to contact me at ext. 136 (Barrie Campus) or at 487-2143.

Thanks,

Mary O'Farrell-Bowers

Mary O'Farrell-Bowers

/attachment
Word Matrix

EN SOUND CAMPUS

SUMMARY OF POST SECONDARY WITHDRAWALS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
*CAMPUS TOTAL**	5	7	2	1	0	1	7	9
PRESENT COMPARISON (%)	40.0%		-50.0%				28.6%	
COLLEGE TOTAL	53	52	10	8	4	10	67	70
PRESENT COMPARISON (%)	-1.9%		-20.0%		150.0%		4.5%	

SUMMARY OF PART-TIME REGISTRATIONS

	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	3/1/93	Present	3/1/93	Present	3/1/93	Present	3/1/93	Present
*CAMPUS TOTAL**	21	17	7	4	4	3	32	24
PRESENT COMPARISON (%)	-19.0%		-42.9%		-25.0%		-25.0%	
COLLEGE TOTAL	85	117	72	92	34	42	191	251
PRESENT COMPARISON (%)	37.6%		27.8%		23.5%		31.4%	

Appendix F

STYLE CHARACTERISTICS OF THE DOMINANT CONCRETE SEQUENTIAL INDIVIDUAL

WORLD OF REALITY—CONCRETE

The "real" world for the dominant Concrete Sequential is the concrete, physical, objective world. "What is" is that which appears to and is detectable through his extraordinary physical sensory abilities of sight, sound, touch, taste, and smell.

Reality to the Concrete Sequential contains solid people, actual places, and real things. He receives data from and produces in the concrete world as well. This world is static, objective, and predictable. The CS view of reality is symbolized in the statement, "Man must not only see everything through his own eyes, but will always be unable to accept what he cannot so examine." (Marc Edmund Jones)

ORDERING ABILITY—SEQUENTIAL

The dominant Concrete Sequential views and approaches experiences in his world of reality in an ordered, sequential, rectilinear, and one-dimensional manner. He expresses concerns about "bottom lines," "crossing lines," and "deadlines." Events are conceived as being joined in a successive and continuous manner like links in a chain. Consequently, he thinks by using a "train of thought" which has a clear beginning and a clear end.

View of Time

The dominant Concrete Sequential views time as consisting of discrete units which are divided into periods of an immediate past, the present, and an immediate future. Events that will occur in the future are, to the CS, predicted and anticipated as "natural" results and outgrowths of past and present conditions and activities. He is a firm believer that the key to the future is in the hands of present behavior and actions.

Thinking Processes

The dominant Concrete Sequential's thinking processes are instinctive, methodical, and deliberate. Having finely tuned powers of the physical senses, he registers objects in the concrete world extraordinarily well. He discriminates between and among sounds, tastes, and smells extremely effectively. Many also exhibit "photographic" memory. The outer orientation of the CS often results in his attributing the cause of subjective thoughts, intuitive flashes, and feelings to environmental stimuli. In these instances, he would look for external causes of divorce, unhappiness, joy, etc.

The Concrete Sequential is naturally structued and uses prescribed formulae in dealing with the world. He can exhibit a healthy sense of criticalness which may border on the ultraconservative. When life experiences appear to be chaotic or fortuitous, he has been known to coerce ideas, people, places, or things into a logic pattern suitable to him.

Consistently striving for perfection, the Concrete Sequential can work with the exactitude of a machine and detect the most minute detail, flaw, and variance with uncanny precision. The dominant CS is able to link successively-connected parts and divide facts and figures into categories and subcategories. His ability to organize logicall produces a linear organizational capacity unsurpassed by any other style.

The Concrete Sequential is usually not interested in abstract theories and will interpret words and labels "literally."

Validation Processes

Validity, proof, and clear-cut discernment of anything is decided by and through the physical senses. Phrases such as "seeing is believing," "I heard it myself," and "you can taste the difference," typify the dominant Concrete Sequential's approach to personal determination of truth. The CS individual has often been called the classic 'Doubting Thomas."

Validation is also made via authorized and credentialed experts who have had accredited instruction and training PLUS professional experience and background. Many Concrete Sequentials place great faith in specialists who explain phenomena which are not personally physically verifiable.

Focus of Attention

The dominant Concrete Sequential rivets his attention to the objective, concrete world and material reality. With his feet planted firmly on the ground, he uses his strong vital instincts and values objects and experiences which stimulate those instincts. He excels in making, gathering, appropriating, controlling, naming, labeling, and owning objects of value and beauty in his environment. Such objects can be persons, places, and things.

Creativity

The dominant Concrete Sequential is not creative in terms of invention or originality. He is, however, a creative producer in two ways: he can produce a concrete product or a prototype from someone else's idea, and he can duplicate a product already in existence. His products are often technologically based.

His desire for perfection aids him in re-creating and refining a product, activity, or procedure to make it more efficient, effective, and economical than the original. Metaphorically speaking, the Concrete Sequential has the ability to produce a beautiful diamond from a rough, unpolished stone.

CS creativity is also evident in his organizational abilities which can be used to align activities for maximum effect.

Approach to Change

The Concrete Sequential can be adverse to change. Being naturally sequential and structured in his thinking, he can find it extremely difficult to break a habit or an existing pattern of operation. He can also find difficulty in opposing tradition.

If a present pattern is working and "paying off," he may be suspect of something "new" which is speculative, untried, experimental, and not yet "guaranteed" to work. This reluctance to change may be viewed as weakness or stubbornness. However, it may well be an outward sign of stability until the new idea or procedure proves itself to his satisfaction.

The CS-oriented individual is generally not easily adaptable to new conditions or environments. This means that change comes in slow, deliberate, incremental steps. He needs to be able to predict events and, if possible, play a role in their development and outcome.

Approach to Life

The dominant Concrete Sequential is a realist who is practical and predictable. He is the "Rock of Gibraltar" and a stabilizing, conservative influence in crisis situations. Cool, calm and collected, patient and hardworking, the CS approaches his life's goals and objectives with careful, precise, steady pacing. He is a responsible and dependable individual who will firmly abide by the laws, mores, ethics, and traditions inherent in his environment. His loyalty, tenacity, endurance, and strength are evident when the "going gets tough."

Since he is concrete in his view and perfection-oriented in his actions, the dominant Concrete Sequential expects to receive something tangible for his time, effort, hard work and resulting product. He therefore anticipates a reward (grades, money) or recognition (status, promotion) or a compliment, "thank you" or some type of verbal appreciation for a job that he considers done well.

Environmental Preference

The Concrete Sequential prefers and will seek

a quiet, ordered, predictable and stable environment. He wants objects in his environment to be functionally-dependable and, above all, practical. An unsanitary, unordered environment can virtually "drive him up the wall."

The Concrete Sequential wants and needs to know what is expected of him and have specific directions before he will proceed to begin any assigned task. This need does not rise from an ego deficiency, necessarily, but more often from his desire to do a job correctly and/or learn by imitating the behavior of an expert.

With a low tolerance for distraction, the Concrete Sequential functions best when the environment is relatively free of peripheral sound and activity. In any work environment, the CS individual will expect his fellow employees to be dedicated, loyal, task-oriented and productive. The qualitative and quantitative standards he sets for himself and others are often extremely high.

Use of Language

Since the Concrete Sequential deals with physical objects, he uses words as literal labels and names to describe what he physically and materially experiences as reality in the objective world. Practical and conservative, the CS uses words that are neat, clean, concise, and to the point. He prides himself on being succinct, logical, and exact. He shuns "flowery language," complex sentences, and "two-dollar words" which, according to him, confuse both the issue and the listener. He believes that academic, poetic, and esoteric words cloud the ability of people to see that the answer is "as clear as the nose on your face."

Usually cautious and diplomatic in expressing himself, the Concrete Sequential can also be quite arbitrary and dictatorial in expressing his opinions and in giving directions to others. As a disciplinarian, he can be a "hard nosed" individual.

Primary Evaluative Word

The word "good" is used by the Concrete Sequential to indicate a top-level performance.

Major Intolerances

In general, the dominant Concrete Sequential dislikes:

- physical and environmental conditions which are not conventionally correct.
- individuals who are flagrant violators of norms,
- broken promises and "surprises,"
- people who procrastinate,
- discussions which appear to be "academic" rather than down-to-earth, and
- individuals who are "too emotional" in their decisionmaking.

Negative Characteristics

Negative CS behavior may manifest itself as follows:

- inflexibility and rigidity,
- excessive criticism and skepticism even though they themselves dislike being criticized,
- viewing people as "objects" to be controlled and owned,
- addiction to routine and order,
- susceptibility to autocratic and dogmatic belief systems,
- entrenched materialism coupled with unwillingness to give credence to an invisible world,
- lack of sympathy and compassion,
- an unforgiving, grudge-holding temperament accompanied by an explosive anger and
- a self-righteous attitude.

Observable Traits

In general, the following traits may be observed:

Concrete Sequential individuals are habitual. Beds are always made upon rising. Immediately after dinner, the table is cleared and the dishes are washed, dried, and put back on the shelves. They drive along the same route to work every morning and their day is time and task-oriented. Although these routines may appear boorish to others, the CS is quite convinced and satisfied that his ways will work, have worked, and will work for others if only they would "see the light" and do things the right way.

Concrete Sequentials usually see things in

terms of being either black or white. This trait is often irritating to others who are unaware that this attitude is a sign of the CS'ers discriminating ability. Anything in between the two extremes is generally too fuzzy or amorphous for the Concrete Sequential to base a value decision upon. Consequently he will usually answer a question or offer an opinion of "yes/no, right/wrong, tastes good/tastes bad, or sounds good/sounds bad."

Concrete Sequentials choose their wardrobe with particular care and economy. They are drawn to three-piece business suits and monochromatic outfits. A CS would not think of wearing mismatched plaids, flashy colors, or being seen in unconventional or untraditional clothing. They can be fussbudgets when it comes to neatness, wrinkle-free suits, the correct hairdo, perfect make-up, and spit-shined shoes.

Concrete Sequentials seldom lose anything. They know where everything has been put and is located. If you lose or misplace something, ask them and they will tell you immediately where it is or where they have put it.

If you invite a Concrete Sequential to a meeting or dinner party, you can be sure that he will attend and arrive on time or have a proper excuse. Meeting obligations and time commitments are as sacred to the CS as his bank deposits and up-to-date checkbook.

The presents that a Concrete Sequential gives to others will be practical. They like to give and receive cash or gift certificates, potted plants, toasters, lawnmowers, etc. Gifts such as short-lived cut flowers, a book of poems, or satin sheets are considered frivolous.

Concrete Sequentials mark special occasions such as birthdays, anniversaries and holidays by sending cards and gifts. They also send get-well cards. They do not, as a rule, send surprise gifts or "just-thinking-of-you" cards on non-occasions.

A Concrete Sequential parent is a loving, but true disciplinarian. Homework is to be taken seriously and done each night (preferably before dinner and definitely before television watching). And, the teacher is always right! Household duties are delegated with a roster and time schedule taped to the refrigerator door. Thank you letters for gifts from grandparents and relatives must be written and in the mail within twenty-four hours after receipt. And, the CS will demand that there will be no public displays of affection between their children and their dates within 500 feet of the house.

Concrete Sequentials rarely give compliments. They expect a good performance, a job well done, a neat appearance in others, and a smooth-running environment. Approval is generally silent and they operate under the maximum of "No news is good news." The CS is not reticient, however, to clearly show disapproval.

A desk or office belonging to a Concrete Sequential will not be messy or disorganized. Pencils are sharpened, file trays empty, desk drawers neatly divided with metal inserts, and a memo pad sits squarely by the telephone. Office furniture is streamlined, comfortable, and efficient. If there are any plants in the office they will most likely be plastic because the CS is not known for his "green thumb."

A Concrete Sequential guest in your home can often smell fish in the air a day after you had it for dinner, a kitty litter box in the basement, and tell you the name of the perfume or aftershare you are wearing. Many CS'ers can taste the bay leaf in your stew, the dash of Tabasco in his Bloody Mary, and name the year of the wine served with dinner.

DOMINANT STYLE CHARACTERISTICS

The scores you received on the *Style Delineator* are related to specific clusters of distinguishable characteristics. These clusters of characteristics constitute STYLE.

This section of the booklet contains style characteristics associated with each channel. They are presented for your own self-analysis and for gaining insight into another person's "point of view."

Knowledge of these characteristics may further prompt an analysis of the demands that are presently being placed upon you by people, objects, and processes in your environment(s). A careful study of style characteristics may also provide a framework with which you can assess mind qualities and environmental demands without the use of an "objective" instrument such as the *Style Delineator*.

To help explain the broad scope of the dominant stylistic characteristics, each channel has been divided into fifteen categories. A description of each category is as follows:

CATEGORIES

World of Reality
The "space" acknowledged as reality by an individual wherein and through which the mind receives, creates, projects, and experiences thoughts, ideas, and forms. This space may be physical, material, and concrete and/or metaphysical, formless, and abstract.

Ordering Ability
The method(s) used by an individual to organize and structure his world of reality.

View of Time
An individual's perception of the past, present, and future used to measure, locate, and place experiences in his world of reality.

Thinking Processes
The activity of examining whatever happens to pass or to attract attention regardless of results and specific content. (Hannah Arendt)

Validation Process
The particular thought process and activity which takes place in the mind of an individual in order to identify, judge, substantiate, and confirm "truth."

Focus of Attention
The dominant "object" which an individual concentrates upon, cares for, pays regard to, respects, and, at times, identifies with and chooses to possess and appropriate.

Creativity
The ability and process used to bring an idea into manifestation and/or existence as a product.

Approach to Change
The attitudes, activities, and courses used by an individual to make something's nature, purpose, content, form, etc., different from what it is or from what it would have been if left to its own evolution.

Approach to Life
The attitudes, activities, and courses used by an individual to command and direct experiences in his "world of reality."

Environmental Preference
The outer world conditions which an individual finds most attractive and conducive to facilitating the fulfillment of his needs, wants, and desires.

Use of Language
The employment of specific words which give tangible evidence that different types of thinking processes are occurring within a person's mind.

Primary Evaluative Word
The word(s) most often used by an individual reporting a value judgment of the highest rank

Major Intolerances

Perceived attitudes, behaviors, and environmental conditions which irritate an individual to the point where he refuses to allow them to exist.

Negative Characteristics

Peculiar qualities and tendencies of an individual which cause alienation and block constructiveness, helpfulness, cooperativeness, and interfere with the psychic well-being of both himself and others.

Observable Traits

Sample distinguishable behaviors that can be observed by other individuals.

NOTE: As you proceed through the style characteristics found on the following pages, bear in mind that no individual is a "pure type" due to the holistic nature of the human personality itself.

STYLE COMPARISON

Following are brief synopses of the style characteristics of the four dominant channels.

Category	CS Concrete Sequential	AS Abstract Sequential	AR Abstract Random	CR Concrete Random
WORLD OF REALITY	Concrete world of the physical senses	Abstract world of intellect based upon concrete world	Abstract world of feeling and emotion	Concrete world of activity and abstract world of intuition
ORDERING ABILITY	Sequential step-by-step linear progression	Sequential and two-dimensional: tree-like	Random non-linear and multi-dimensional	Random three- dimensional patterns
VIEW OF TIME	Discrete units of past, present, future	The present, historical past, and projected future	The moment: time is artificial and restrictive	Now: total of the past, interactive present and seed for the future
THINKING PROCESSES	Instinctive, methodical, deliberate, structured	Intellectual, logical, analytical, rational	Emotional, psychic, perceptive, critical	Intuitive, instinctive, impulsive, independent
VALIDATION PROCESS	Personal proof via the senses: accredited experts	Personal intellectual formulae: conventionally accredited experts	Inner guidance system	Practical demonstration: personal proof: rarely accepting of outside authority
FOCUS OF ATTENTION	Material reality: objects of value	Knowledge facts, documentation	Emotional attachments, relationships and memories	Applications, methods, processes and ideals
CREATIVITY	Product, prototype, refinement, duplication	Synthesis, theories, models and matrices	Imagination, the arts, refinement, relationships	Intuition, originality, inventive and futuristic
APPROACH TO CHANGE	Slightly adverse: speculative, hesitant and slow	Notoriously indecisive, cross-checks, deliberation, fence-straddler	Subject to emotions, level of interest: critical or impressionable	Open and amenable, often instigator,"rolling stone," "trouble shooter"
APPROACH TO LIFE	Realist, patient, conservative and perfection-oriented	Realist:serious, determined, logical and intellectual	Idealist: emotional, exuberant, transcendent and intense	Realist\idealist:telescopic attitudinal, inquisitive, and independent
ENVIRON-MENTAL PREFERENCE	Ordered, practical, quiet, stable	Mentally stimulating, ordered and quiet, non-authoritative	Emotional and physical freedom: rich: active and colourful	Stimulus-rick, competitive, free from restriction, amenable
USE OF LANGUAGE	Literal meaning and labels: succinct, logical	Polysyllabic work:precise, rational: highly verbal	Metaphoric, uses gestures and body language: colorful	Informative, lively, colourful: "words do not convey true meaning"
PRIMARY EVALUATIVE WORD(S)	Good	Excellent	Super, Fantastic, Out-Of-Sight, Dynamite	Superior, Great